INVESTIGATION OF THE FIRE DEPARTMENT OF NEW YORK

A REPORT FOR THE COMMISSIONERS OF ACCOUNTS, BY GREELY S. CURTIS, CON. ENG'R, REPRESENTING THE MERCHANTS' ASSOCIATION OF NEW YORK

MAY 5, 1908

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PREFATORY.

IN January, 1908, Mayor McClellan directed his Commissioners of Accounts, Messrs. John Purroy Mitchel and Ernest Y. Gallaher, to make an investigation of the methods and efficiency of the Fire Department of New York.

The Merchants' Association's Committee on Insurance tendered to the Commissioners the expert services of Captain Greely S. Curtis, Consulting Engineer, for the purposes of the examination, which tender was accepted. Acting under the instruction of the Commissioners, Capt. Curtis examined into certain features of the organization, administration and operation of the Fire Department, (other branches of the investigation having been assigned to the New York Board of Fire Underwriters) and on behalf of The Merchants' Association, made to the Commissioners of Accounts the following report thereon.

NEW YORK FIRE DEPARTMENT INVESTIGATION.

TOPICS.

ORGANIZATION.

- Supervision.
- Subdivisions.
- Membership and Salaries.

ADMINISTRATION.

- Commissioner and Deputy Commissioners.
- Headquarters Staff.
- Fire Marshal.

OPERATION.

- Enlistment.
- Promotion.
- Retirement.
- Fire Methods.

PERSONNEL.

- Uniformed Force.

PARKER BUILDING FIRE. (Appendix A).

- Personal Observation and Comments.

REPORT ON HOSE SPECIFICATIONS. (Appendix B)

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PART II.

PART III.

APPENDICES.

LETTER OF TRANSMITTAL.

NEW YORK, June 4, 1908.

Frank R. Chambers, Esq.,
Chairman Committee on Insurance
The Merchants' Association of New York.

SIR:

I have the honor to transmit herewith a complete copy of the report on the New York Fire Department which I presented to the Honorable Commissioners of Accounts in the course of their investigation.

This is accompanied by the report made by Mr. H. F. J. Porter on certain features of the Fire Department. Most of the essential points contained in Mr. Porter's report have been embodied in my full report and will be found in Part I of that report.

The recommendations concerning the subjects touched on in Part I do not appear in the report as presented to the Commissioners of Accounts, as it was considered wiser that these recommendations should be taken up by the Merchants' Association directly with the Fire Department. The recommendations referred to are as follows:

IMPROVEMENTS RECOMMENDED.

CONCERNING THE HEADQUARTERS OFFICIALS AND METHODS OF THE NEW YORK FIRE DEPARTMENT.

Commissioner and Deputy Commissioners.

That the position of Deputy Commissioner be made permanent and appointments to that position be subject to the Civil Service rules.

Headquarters Staff.

That transfers in the clerical staff be made only when the service will obviously benefit thereby.

That those temporary details which have become practically permanent be recognized and be made permanent transfers.

That periodic conferences be held by the heads of the various bureaus under the supervision of the Fire Commissioner or a Deputy Commissioner.

That the services of a methodizer be engaged at suitable intervals to modernize the methods employed in handling the business of the department.

That the annual report of the department be properly edited and issued without unreasonable delay.

That the transactions of the Fire Department be made available for publication in the City Record with greater promptness than obtains at present.

That the Bureau of Violations and Auxiliary Fire Appliances be established upon a proper basis and be organized with sufficient permanent members to carry out its work efficiently.

That the men detailed from the uniformed force to perform clerical and other duties be given proper training in the service to which they may be assigned only after an investigation has shown that the individual men are capable of executing such service efficiently. This refers particularly to what is known as " medical details."

That proper steps be taken to lessen the interruptions to which the staff at headquarters are at present subject.

Fire Marshal.

That the work of the Bureau of Fire Marshal be made more effective through disseminating the information gathered by that office more fully, and also through closer cooperation between the Fire Marshal's office and the underwriting interests.

In carrying out the investigation I have received every assistance from the Commissioners of Accounts and courtesies from the Fire Department, particularly through the late Commissioner Bonner and Chief of Department Edward F. Croker. Commissioner Hayes also very courteously rendered Mr. Porter valuable assistance both personally and through the subordinates at headquarters in the progress of the work carried out by the latter gentleman.

Respectfully submitted,

GREELY S. CURTIS,

Consulting Engineer.

PART I

ORGANIZATION
ADMINISTRATION
OPERATION: Fire Force

ORGANIZATION OF THE DEPARTMENT.

SUPERVISION.

THE Fire Department is under the responsible supervision of a single Commissioner, who is appointed by the Mayor. Under the Charter, Section 95, the Mayor may remove the Fire Commissioner at any time whenever in his opinion the public interest requires it. Other than this no stated period is set for the Commissioner's term of office, but it is customary to change the incumbent of the position of Fire Commissioner whenever a new city administration takes office.

The Commissioner has power under the Charter to appoint and at pleasure remove, two Deputy Commissioners, who are expected to perform such duties as may be directed by the Commissioner. In recent years the practice appears to be for the city administration to designate the Deputy Commissioners with the acquiescence of the Commissioner. One of the Deputies is delegated to perform such duties and business of the Fire Department in the Boroughs of Brooklyn and Queens as may be directed by the Commissioner. In practice this Deputy is given practically a free hand in the management of the department in Brooklyn and Queens except that his actions are nominally subject to the approval of the Commissioner. The other Deputy takes charge of the maintenance of discipline and many routine matters in the Boroughs of Manhattan, The Bronx and Richmond, his actions also being subject to the approval of the Commissioner. The Commissioner has power to authorize one of his Deputies in his absence to assume all the functions of the Commissioner except in regard to appointments, promotions or dismissals in the uniformed force.

Under the Charter, the Commissioner has the exclusive power to govern and manage the department, to make all necessary purchases, and to organize it into such bureaus as may be convenient and necessary for the performance of the duties imposed

by the Charter. Also to select the heads of all bureaus and their assistants. He is, however, restricted in making changes in the uniformed force through the operation of the Civil Service act, and also to a slight extent by the Charter provision that assignments to duty and promotions in the uniformed force shall be made by the Fire Commissioner upon the recommendation of the Chief of Department. This provision has apparently lost part of its efficacy in recent years.

SUBDIVISIONS.

THE work of the department is subdivided into ten bureaus or branches in Manhattan and seven in Brooklyn. These bureaus are indicated diagrammatically on Chart A, submitted herewith, in which the Bureau of Chief of Department and the Bureau of Fire Alarm Telegraph are further subdivided according to borough limits for convenience on the city pay rolls. The bureaus specified on the chart are listed in the order in which their respective pay rolls appear in the budget for the current year.

BOROUGHS OF MANHATTAN, THE BRONX AND RICHMOND.

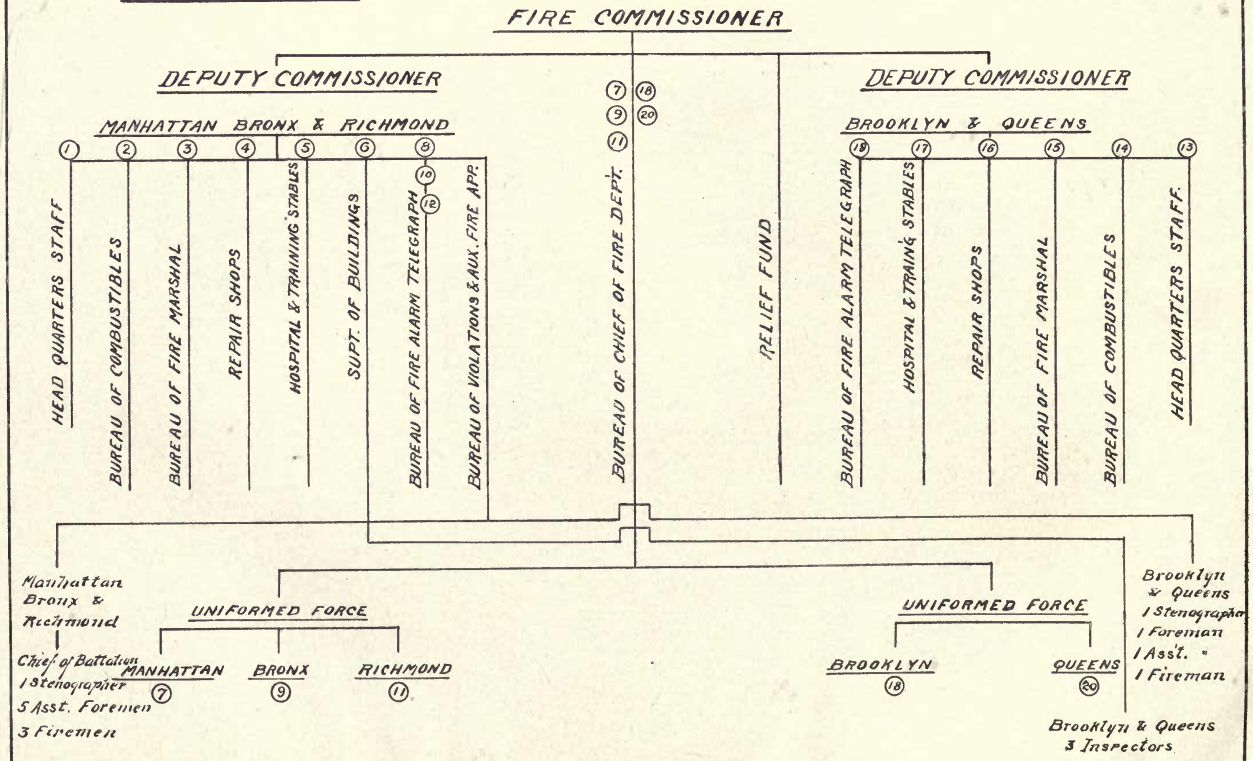
Headquarters Staff.
Bureau of Combustibles.
Bureau of Fire Marshal.
Repair Shops.
Hospital and Training Stables.
Superintendent of Buildings.
Bureau of Chief of Department. (Manhattan Bronx and Richmond.)
Bureau of Fire Alarm Telegraph. (Manhattan, Bronx and Richmond.)
Bureau of Violations and Auxiliary Fire Appliances. (No pay roll.)
Relief Fund. (No pay roll.)

BOROUGHS OF BROOKLYN AND QUEENS.

Headquarters Staff.
Bureau of Combustibles.
Bureau of Fire Marshal.

DEPARTMENT ORGANIZATION — CHART A

March 28th 1908



Repair Shops.
Hospital and Training Stables.
Bureau of Chief of Department.
Bureau of Fire Alarm Telegraph.

The above bureaus and subdivisions stand on different footings. In the latest report issued by the Fire Department the Secretary of the Relief Fund is listed with the headquarters staff, the officers in charge of the Repair Shops, and of the Hospital and Training Stables in both Manhattan and Brooklyn appear under the Bureau of Chief of Department, while the subordinates in these two branches are listed under Repair Shops, and Hospital and Training Stables, respectively.

The Bureau of Violations and Auxiliary Fire Appliances does not appear in the list, as the officer in charge and his subordinates are almost all detailed from the Bureau Chief of Department.

The status of this particular bureau has been a cause of considerable friction since its establishment in December, 1903. Under the Charter, Section 727, the Bureau Chief of Department is charged with the duty of preventing and extinguishing fires and of protecting property from water used at fires. The claim is made that in virtue of this section of the Charter, the Bureau of Violations and Auxiliary Fire Appliances, which has to do with the prevention of fires and appliances to supply water for their extinguishment, belongs properly under the control of the Chief of Department. Under the existing arrangement the officer in charge of the Bureau of Violations and Auxiliary Fire Appliances reports directly to the Fire Commissioner and is in no manner responsible to the Chief of Department, leaving, it is claimed, the latter responsible official with practically no knowledge of what appliances are ordered or what notices are served to provide auxiliary fire appliances. In this connection, reference is made to letters from the Chief of Department to the Fire Commissioner under dates of February 26, 1904, and February 8, 1908. In the letters referred to, the Chief of Department asks that details of members of the uniformed force to the Bureau of Violations be revoked, indicating thereby, that the details exist in contravention of the intent of Section 728 of the Charter. Section 728 provides that assignments to duty in the uniformed force

shall be made by the Fire Commissioner upon the recommendation of the Chief of Department.

It is recommended that the Bureau of Violations be established on a permanent basis, preferably with civilian employees and a competent engineering staff all appointed through the Civil Service Commission.

The general subject of fire prevention is of so great importance that it deserves fuller recognition by the Fire Department. A Bureau of Fire Prevention under a permanent officer of rank analogous to that of the Chief of Department could add materially to the security of the city if given proper authority and organization. The present Bureaus of Violations and Auxiliary Fire Appliances, of Combustibles and of the Fire Marshal would properly become subdivisions of the proposed Bureau of Fire Prevention as all of them have to do more with the prevention rather than the extinguishment of fires. With wider powers to require automatic building protection, correction of dangerous conditions, establishment of stricter building laws, etc., such a bureau could do much to improve fire conditions in the city.

Bureau Chief of Department.

The entire fire fighting force of the five boroughs is divided into thirteen divisions under the control and supervision of the Chief of Department. Each division is under the immediate supervision of a Deputy Chief, and in addition the four divisions in Brooklyn and Queens are supervised by the Deputy Chief in charge of those boroughs. The Boroughs of Manhattan and The Bronx are divided into seven divisions, the larger part of the Bronx forming a single one of these seven divisions. The Borough of Richmond is a separate Fire Department division. The seven fire boat companies are not attached to any of the land divisions but form a separate marine division under an Acting Deputy Chief.

With the exception of the marine division which comprises a single battalion, each division is subdivided into two or more battalions. With one exception each Manhattan division comprises three battalions, the Bronx division consists of four battalions, the Richmond division of two battalions. Three of the

BUREAU CHIEF OF DEPARTMENT — CHART B

ASSIGNMENT OF CHIEF OFFICERS

APRIL 1908

EDWARD F CROKER CHIEF OF DEPT.

MANHATTAN BRONX & RICHMOND

DEPUTY CHFS.	DIV.	BAT.	BATTALION CH'FS.
Wm Guerin	1	1	Wm H Duffy
		2	B J Galvin
(A) J B Martin	2	3	E J Worth
		4	J C Brogan
		5	T F Norton
T R Langford	3	6	C H Shay
		7	G L Ross
		8	T F Skelly
Jn Binns	4	9	J F Devanny
		11	Jos Crawley
		25	Owen McKernan
Wm Duane	5	10	T F Dougherty
		12	J F O'Connor
		16	T F Kane
R W Callaghan	6	13	Peter Andrews
		18	T F Hayes
		24	E S Root
Thos Ahearn	7	14	Peter Sloan
		15	P H Short
		17	J F King
		20	F J Gray
J J McCartney	8	21	Thos King No 1
		22	Michael Martin
(B) Jn Kenlon Marine Division		19	J B Conlon
(A) F W Gooderson			

BATTALION CHF DETAILS	
G F Farrell	Drill Master
Thos Barrett	Repair Shops
Jos Shay	Vetinary Hospital & Training Stables
W T Beggin	Bureau of Violations & auxiliary fire appliances
E F Terpeny	Relieving Officer
J P Howe	Relieving Officer
P J Graham	Relieving Officer

THOS LALLY DEPUTY CHF IN CHARGE BKLYN & QUEENS

DEPUTY CHFS.	DIV.	BAT.	BATTALION CHFS.
F J Duffy	10	31	H P Kirk
		32	Jas Reilly
		33	J J Dooley
		34	E J McKenna
		38	J T Farrell
J J Burns	11	35	M E C Graham
		36	Wm McCarthy
		45	Henry Hauck
J F Murray	12	46	W C Clark
		49	Jas Langan
		40	P F Lucas
		41	Jas Kellock
		42	Pat. Maher
		43	W C Rogers
		48	Jas Cummings.
John O'Hara	13	37	B A Matschke
		39	Pat. McGuire
		44	J J Donohue
		47	W E Lawrence Jr.
		50	C H Stone
		51	Thos. Larkin

BATTALION CHF DETAILS	
E J Norton	Deputy Commissioner's Bureau
P Nevins	Repair Shops
E H Heard	Vetinary Hospital & Training Stables
John Murphy	Supply Bureau
L T Hauk	Relieving Officer
H Wackerman	Relieving Officer
M J Smith	Relieving Officer

Notes:- (A) Detailed from Brooklyn & Queens
(B) Battalion Chief Acting Deputy Chief

Brooklyn and Queens divisions are made up of five battalions each, the fourth division having six battalions. Each of the forty-five battalions is commanded by a battalion chief who has from four to seven companies under his charge.

MEMBERSHIP AND SALARIES.

ON December 31, 1907, the total number of employees of the Fire Department was 4,609. (According to list in City Record, Vol. 36, No. 10562, Pages 88 to 134.)

The number of men in the uniformed fire force including all chief officers, company officers, engineers of steamers and firemen was 4,066, exclusive of medical officers, chaplains, pilots, stokers, etc.

SUMMARY OF MEMBERSHIP.

	MANHATTAN THE BRONX RICHMOND.	BROOKLYN AND QUEENS.	TOTAL.
Headquarters Staff.....	36	18	54
Bureau Chief of Dept.:			
Uniformed Fire Force...	2489	1568	4066
Staff, etc., including medical officers, Chaplains, clerks.....	13	9	22
Marine Engineers, Pilots, ununiformed firemen, stokers, etc.....	59	10	69
Bureau of Combustibles...	15	10	25
Bureau of Fire Marshal ...	12	7	19
Bureau of Fire Alarm Telegraph.....	98	36	134
Repair Shops	119	39	158
Hospital and Training Stables	24	4	28
Supt. of Buildings' Branch.	34	....	34
Total Membership	2908	1701	4609

Officers and firemen detailed from Bureau of Chief of Department to other bureaus are included above under Bureau Chief of Department, Uniformed Fire Force.

Uniformed Force.—Bureau Chief of Dept.

December 31, 1907.

(Figures taken from City Record, Loc. Cit.)

	MANHATTAN THE BRONX RICHMOND.	BROOKLYN AND QUEENS.	TOTAL.
Chief of Department	1	....	1
Deputy Chiefs	8	7	15
Battalion Chiefs	32	28	60
Medical Officers	6	5	11
Chaplains	2	2	4
Foremen	132	104	236
Assistant Foremen	208	138	346
Engr. of Steamers	244	194	438
Pilots and Marine Engineers	13	6	19
Firemen, First Grade	1060	804	1864
" Second "	233	108	341
" Third "	198	104	302
" Fourth "	382	81	463
Total	2519	1581	4100

Uniformed Force.—Salaries.

Chief of Department	$7,000
Deputy Chief in charge of Brooklyn and Queens	5,000
Deputy Chiefs	4,200
Battalion Chiefs	3,300
Medical Officers	3,300
Chaplains	1,000
Foremen	2,160
Assistant Foremen	1,800
Engineers of Steamers	1,600
Marine Engineers	1,400
Pilots	1,500
Firemen, First Grade	1,400
" Second "	1,200
" Third "	1,000
" Fourth "	800

ADMINISTRATION.

FIRE COMMISSIONER.

THE Fire Commissioner receives a salary of $7,500. He is under bonds of $20,000 as Commissioner and $100,000 as Treasurer of the Relief Fund and the Life Insurance Fund. A private secretary at $2,500 is provided for him, also an automobile and chauffeur, the latter being detailed from the uniformed force.

The present Commissioner, Nicholas J. Hayes, has been engaged in the public service for many years, and is the Democratic leader of the 28th district. He resigned from the position of Fire Commissioner to become Sheriff of New York County, January 1st, 1906, which position he held for two years. Commissioner Hayes was succeeded in the fire department by Commissioner John H. O'Brien, January 1, 1906 to October 10, 1906, who was followed by Fire Commissioner Francis J. Lantry, October 10, 1906 to February 10, 1908. Hugh Bonner, former Chief of the Department held the position of Commissioner from February 11, 1908, until his death on March 13, 1908. Commissioner Hayes took charge on March 20, 1908.

DEPUTY FIRE COMMISSIONERS.

UNDER the Commissioner and immediately responsible to him are the two Deputy Commissioners authorized by law at salaries of $5,000 each. One Deputy Commissioner sits in Manhattan, the other taking charge of department affairs in Brooklyn and Queens. Under the Charter, the authority and powers of the Commissioner may be delegated to one of the Deputy Commissioners, except that the latter may not control either the promotion or removal of members of the uniformed force. The custom has been for the Deputy Commissioners to take charge of the trials of members of the uniformed force, to attend to furnishing supplies, and many routine matters connected with the department. The Deputy Commissioner in charge in Brooklyn and Queens has in the recent past exercised wide control over the Fire Department

affairs in those boroughs subject to the formal approval of the Commissioner.

The two present Deputy Commissioners, Messrs. Patrick A. Whitney and Charles C. Wise, are reported to take an active interest in politics, the former being secretary of the Democratic organization in the 12th district, known as the Anawanda Club. Mr. Whitney was appointed Deputy Commissioner, February 11, 1908.

Under Commissioner Wise who was appointed Deputy Commissioner in charge of Brooklyn and Queens in January 1906, the paid department has been extended throughout the more important portions of the Borough of Queens where formerly the protection consisted exclusively of volunteer companies.

POLITICAL APPOINTEES.

THE effect of placing active political leaders in charge of the Fire Department is generally recognized as injurious to the morale and efficiency of the department. At the same time it is difficult or impossible to secure competent evidence to prove any direct connection between political influences and a lowered condition of efficiency in the department. Unfortunately the mere reports that one man failed of promotion because his politics were not right and that another escaped with a slight penalty because he was solid with the proper leader, are sufficient to produce an effect on the rank and file without the presentation of legal evidence to substantiate the reports. Claims have been made that those who are "right" politically have been given easy assignments at headquarters, or have been otherwise taken care of when in difficulties. It is obvious that these claims are incapable of proof; but proofs are not necessary in order to establish the general belief throughout the department that certain men either profit or suffer through political influences. As a result, the morale of the force is affected, discipline is impaired and the efficiency of the entire organization is distinctly lowered.

In contrast to these conditions, statements have been made by those in a position to know that the appointment of Hugh Bonner to the Commissionership was immediately followed by a toning up

HEADQUARTERS STAFF MANHATTAN — CHART C

April 1908

NICHOLAS J HAYES — COMMISSIONER — $7500

PATRICK A WHITNEY — DEPUTY COMM'R. — $5000

Mark Levy — Secty to Commr. — $2500

Peter J Quigley — Secty Relief Fund & Life Ins Fund — $3000

WILLIAM A LARNEY — SECTY OF DEPT — $4800

W T Yarrow — Chauffeur to Commr — $1400

Detailed from Uniformed Force

JOHN R SHIELDS — ASST. SECTY. OF DEPT — $3500

CLERICAL

G H Perley	Chf Clk	$2400
D Graham	Clk	$1800
J Brower	"	$1800
T F Aram	Stenog. & Typ'Wtr.	$1200
[H R Holstein (A)]	"	$1200
[J L McKean (A)]	"	$1200
C A Devlin	Court "	$1800
D A Gallagher (C)	"	$1500
J Lieberman (B)	"	$1200
[H F Perley (E)]		$2160
M Harmuth	"	$1200

MESSENGERS

L O Winkelback	Bk'per	$1800
M P Corrigan	Clk	$1500
[W. B. Watts (D)]	Stenog.	$1600
[J J C Seufert (D)]	Mssr.	1400
[W Sprague (D)]	"	

BOOKEEPING

[F J Hendricks (G)]	Cash'r	$2000
W F Healey	Clk	$1800
F M'Caffrey	Store Kpr	$1500
J R Day	Insp'r of Fuel	$1500
[Ed F Ryan (D) Act'g	"	$2160
[Wm J Collins (E)	Stenog. & Clk	$1050
[J J Flood (D)	Clk & Mssr	$1200

PURCHASING

BUILDING SUPERVISION

[Capt. M Monohue (F)]	Supt. of Bldgs	$2160
J Snyder	Engr	$4.50 per da.
2 Stokers	@	$3.00 " "
[J A Morrison (E)]	Engr & Stoker	$1600
2 Elevator Attendants	@	$912.50
A Connor	Attd't & Watchm	$1100
W F Gillen	Chf'r & "	912.50
4 Cleaners	@	$2.50 per da.
2 "	@	$360
[One Vacancy	Chf'r.	$1095]

Note:- Names in brackets draw pay on another payroll

(A) Detailed from Chief of Dept

(B) " To " " "

(C) " " Bureau of Violations

(D) Medical Detail from Uniformed Force

(E) Detail from Bld'g. Supt. Office

(F) Detail " Uniformed Force

(G) Position of Cashier was transferred to Bureau of Combustibles April. 1908

of the discipline throughout the fire force and by a noticeable improvement in the general morale and efficiency of the department.

HEADQUARTERS STAFF.

Secretary of Fire Department.

THE routine office work of the department is in charge of the Secretary of the Department, Mr. William A. Larney, who was appointed to his present position by Commissioner Lantry, December 4, 1907; salary, $4,800. The mail of the department comes to him in the morning for distribution or answer. He attaches his signature to such routine papers of the department as require it. Mr. Larney previously occupied the position of Inspector of Combustibles in the department.

Secretary to Fire Commissioner.

Mr. Mark Levy occupies the position of Secretary to the Commissioner at a salary of $2,500. Mr. Levy was appointed to this position in April, 1908, having been previously associated politically with the present Commissioner.

Assistant Secretary of Fire Department.

Most of the routine work of the department is supervised by John R. Shields, the Assistant Secretary of the Fire Department, who has been attached to the headquarters staff for some thirty-five years. His salary is $3,500. The work coming under Mr. Shields' supervision includes general charge of the clerical work, preparation of contracts, reports and records.

Chief Clerk.

The clerical work of the department is handled by the Chief Clerk, George D. Perley, who was appointed April, 1893. His salary is $2,400. On an average some seventy-five letters, both foreign and inter-departmental have to be disposed of daily. There are also reports of all fires amounting to twenty or thirty per day. The reports of the different bureaus and the annual report of the department are prepared by the Chief Clerk.

The Chief Clerk is assisted by three stenographers and type-

writers at salaries of $1,200 each. Two of these assistants are carried on the pay roll of the Bureau of Chief of Department and take the places of two other stenographers, who, while carried on the roll of the Headquarters Staff, are detailed to work in other bureaus. As these details were made originally more than four years ago, it would seem advisable to make them permanent transfers. The clerical work of the department is fairly well and efficiently performed. The services of the stenographers and typewriters are extended throughout the office wherever needed.

DEPARTMENTAL METHODS.

Annual Report.

RECENTLY the annual reports have been published within a year or so of the expiration of the period to which they refer. While the interval before publishing is an improvement on the practice of a few years ago, nevertheless the delay materially lessens the value of the report when it is issued and is an indication of unbusinesslike methods. The editing of the annual report is also open to improvement, as for example, the list of the apparatus in service is confused (see pages 92 to 151, annual report of 1906.)

The amount of hose on hand apparently is not stated in the report. The question of hose is referred to by the Commissioner on page 8, by the Chief of Department on page 19, and on page 257 is a statement of the amount of hose received by the repair shop in the course of the year.

Reports of the number of alarms of fire received etc., appear in several pages of the annual report and the figures given do not tally with each other. The report of the medical officer in Manhattan appears on page 263, while no report is made by any similar officer in Brooklyn and Queens. Many other irregularities, all of which show a lack of proper editing, are to be found throughout the report.

Department Transactions.

The record of the work and proceedings of the department are prepared in the office of the Chief Clerk for publication in the City Record. This publication is intended to give the citizens

an opportunity of keeping track of what is done in the Fire Department, but the value of this information is greatly lessened by the delay which occurs before the reports are published. Other city departments are able to present the doings of their bureaus in the City Record within two or three weeks, and there seems to be no reason why the Fire Department should not do the same. As it is, awards of contracts, executive action and similar important facts remain unreported often for a period of months before they appear in the City Record.

For example, an inspection of the files of the City Record made on April 13, 1908, showed that the latest report of the Fire Department transactions appeared on February 25, 1908, and referred to actions which had taken place between January 13 and January 18. Earlier entries, as for example the report appearing in the City Record of February 1, 1908, referred to transactions of the Fire Department in November, 1907.

Clerical Force.

The work of preparing proposals, bids and contracts and keeping up the files relating thereto, is handled by David Graham, appointed 1870, who is assisted by John Brower appointed in 1895. These two clerks receive salaries of $1,800 and $1,200 respectively, and keep the records of all appointments to the department, assignments, etc. They have the services of a stenographer and typewriter at $1,200. This staff handles its work fairly well. The records of assignments, etc., are kept in book form which makes them less easy of access than if they were properly arranged in the form of a card catalog. Should this form of record be adopted, the cards should include additional data which is not now incorporated in the records so that the department would have full information regarding all the persons in its employ.

Book-keeping.

The book-keeping of the department is under the charge of L. O. Winkelbach, appointed 1894, at a salary of $1,800. He is assisted by one clerk and a typewriter, at $1,500 and $1,600 respectively. The typewriter, William B. Watts, has been detailed to this work from active fire service on account of tempo-

rary disability and may at any time be recalled to his other duties. He has occupied his present position for some three years and has become efficient in the work. If such a high salaried man is desired, it would be well to have him permanently transferred to his present position to avoid the necessity of breaking in a new and possibly less efficient man. The investigation of the book-keeping branch of the Fire Department having been assigned to others, no further comments are made in this place other than to suggest that loose leaf ledgers might simplify the work in this branch.

Purchasing and Storekeeping.

The work of purchasing and handling supplies is carried on by a force under W. F. Healy, Clerk and Acting Cashier, at a salary of $1,800. The force includes a stenographer at a salary of $1,050 and a medical detail at $1,200.

The storekeeping is under the charge of Frank McCaffrey, Storekeeper, at $1,500 who inspects all supplies as they are received at headquarters. J. R. Day at $1,500 and Captain E. F. Ryan, at $2,160, a medical detail from the uniformed force, act as inspectors of fuel. Four firemen, all medical details from the uniformed force, assist as receiving clerks and watchmen at store rooms. Two drivers complete the staff of the Storekeeper.

Messenger Service.

The messenger service of the department is supplied by medical details from the uniformed force, i.e., firemen who have been injured in the performance of their duties and are convalescing. According to the Charter (Section 790) these men must render some service and the service here rendered is suitable and satisfactory. As previously noted, other convalescent firemen are employed in various clerical capacities at headquarters.

Supervision of Headquarters Building.

The headquarters building is under the care of Captain M. Donohue of the uniformed force, who has had charge since January 1904. Two engineers, one a detailed engineer of steamer from the uniformed force, and two stokers are in charge of the mechanical plant; salaries, $4.50 and $3.00 per day. Three men are employed at $2.50 per day to maintain a constant elevator service;

two of the night men serve as watchmen and to some extent as cleaners. Four men and two scrubwomen are also employed as cleaners at $2.50 and $1.00 per day.

The Relief Fund and its Administration.

The Relief Fund of the Fire Department which in 1906 had total receipts in excess of $600,000, is maintained under the Treasurership of the Fire Commissioner assisted by a secretary appointed for the purpose. The present Secretary, Peter J. Quigley, was appointed April, 1904, and receives a salary of $3,000 per year. This position is exempt from the control of the Civil Service Commission. There seems to be no good reason why it should not be included with the others under the Civil Service control.

The Relief Fund is frequently augmented by donations from generous citizens who wish to testify their appreciation of the work of the Fire Department. As a matter of fact, such donations do not directly benefit the Fire Department, but are practically transferred to the general purposes of the city. This condition obtains in consequence of a decision of the Corporation Counsel to the effect that the amount of the Relief Fund principal existing May 3, 1904, of $848,555.74 must be neither encroached upon nor exceeded. As the Relief Fund receives the larger part of its support from the excise tax, the Comptroller limits payments from this source to so much as is sufficient to provide for the difference between the obligations of the fund and the income to it from other sources. The effect of this ruling is such that if a citizen makes a donation to the Relief Fund, the amount of his donation is withheld by the Comptroller from the next payment made by the latter to the Relief Fund from the excise taxes. In other words the citizen does not give his money to the Firemen's Relief Fund at all, but indirectly to the city for ordinary municipal purposes. This situation should be made generally known to the public for the benefit of future benefactors of the Fire Department whose donations could presumably be turned to better account along other lines.

Business Administration.

Considering the Fire Department as a business organization,

the Commissioner and his two Deputies represent practically the president and two vice presidents or general managers, the latter being the active agents in administering the business of the department on the two sides of the East River. The Chief of Department represents the superintendent of the operating forces. The heads of bureaus represent the superintendents of less important though allied divisions, while the position of Secretary is comparable to the same position in a business organization. Long experience in the industrial world has demonstrated that to obtain the highest efficiency the positions referred to above should be occupied by experienced men trained to their respective duties and familiar with all the work of their associates with which their own parts of the organization come in contact.

To obtain adequate experience and familiarity with their respective duties requires permanence in their tenure of office and a proper method of selecting the incumbents. Thus, to put the Fire Department organization on a business basis, both Deputy Commissioners and the Secretary should be appointed under approved Civil Service methods and should become permanent members of the department.

Charter Revision.

In order to secure a change in the status of the Deputy Commissioners and the Secretary of the department it would be necessary to secure modifications of those sections of the City Charter which affect the Fire Department. If the change to permanent Deputy Commissioners should be made, the appointment of the right kind of men to the positions mentioned would result in retaining men of experience and familiar with the service in positions where these qualifications are of great value. By carrying out such reconstruction in the organization of the department the efficiency of the force should be improved and its efficient operation remain undisturbed by changes in the city administration.

Transfers and Temporary Details.

The administration of the department has hitherto differed from that of a business organization in many ways, prominent among which is the system of transfers and temporary details. Several transfers have recently been made in the administrative

personnel of the department, some of which have been to the detriment of the work in the various bureaus affected. Changes in the personnel have been made apparently without consideration of the welfare of the bureaus where the employees are engaged, with resulting demoralization in the organization and deterioration in efficiency.

To a limited extent the method employed by the department to make temporary details of individuals from one bureau to another in order to relieve temporary congestion is unobjectionable. It has happened, however, that in several cases temporary details have been allowed to stand so long that they have become practically transfers. On account of these conditions the cost of running the different bureaus as it appears on the pay rolls may not represent the actual cost, owing to the fact that several persons employed in certain bureaus are carried on the pay rolls of some other bureau.

The Bureau of Violations and Auxiliary Fire Appliances may be cited as an example of the practice mentioned above. All of the persons engaged in the work of this bureau are carried on pay rolls of other bureaus, while the Bureau of Violations has no pay roll of its own whatever.

Transfers without Approval by Heads of Bureaus.

In some cases transfers are made without deference to the heads of bureaus affected. Such a practice is to be deprecated as it is obvious that when a superior officer passes over the heads of his responsible chiefs of bureaus and interferes with the rank and file of subordinates direct he can no longer hold his officers responsible for the results.

Uneconomic Methods.

The work of the staff suffers from the frequent transfers and details which are made in its personnel. Many of the men detailed have had no preliminary training for office work and have not a fundamental education to make them efficient for such occupation. They are, however, usually assigned to any work on which extra assistance is needed. This means that the time of others is necessarily taken up in educating them. In some cases this time is

absolutely wasted, as the man detailed may not have the preliminary training necessary as a basis for his further instruction. In many cases a detailed fireman scarcely becomes proficient before he returns to active service on the force, and again the time of those in his group on the staff is taken up in educating his successor. Such arrangements are not economic nor productive of good results.

It seems advisable to establish a system whereby a man's qualifications for clerical work should be promptly ascertained, so that if found to possess capabilities which could be utilized for clerical work, he might be trained by competent teachers and possibly become a permanent transfer to the clerical force. If he is not of the proper calibre and has no propensity for office work he should not absorb the time in educating him of others whose time is more valuable in the performance of their regular work.

A detail in which a slight saving could be effected is found in the quality of the stationery used for requisitions and other routine matters within the department. Printed pads and forms would be less expensive than the lithographed paper now employed for all purposes.

Methodizer.

Throughout the department it is noticeable that methods which were installed thirty years ago are still in use. Modern business methods should be applied to the general conduct of the department and its bureaus, and a vigorous effort should be made to modernize the department throughout. As the best means to attain this end it is recommended that the services of a "Methodizer" or an industrial engineer be retained periodically to advise the heads of the department in regard to the introduction of the most efficient methods.

Conferences.

One method suggested for increasing the efficiency of the organization is to establish conferences at which the heads of bureaus should meet periodically. It would be well to hold these conferences both in Manhattan and Brooklyn, preferably with the Fire Commissioner as presiding officer. In his absence the Deputy Commissioner of the appropriate borough should preside.

Through such conferences it is possible that the former attitude of the administration which has produced an atmosphere of distrust and espionage might be changed towards one better adapted to encourage the development of efficiency. A brief investigation of the existing conditions is sufficient to convince one that there is a lack of coöperation between certain responsible officers of the department which tends greatly to interfere with the best efficiency of the department.

A change in the attitude from distrust towards closer coöperation should result in a marked increase in efficiency.

Efficiency of the Staff.

While a brief inspection of the work of the headquarters staff indicates that it is fairly efficiently performed, the term should be understood as having merely a relative value. A city department like the Fire Department which is not organized to prosecute a business for profit on a competitive basis, and whose organization is supplied through the Civil Service Commission cannot be compared with an industrial or commercial enterprise, but must be compared with other similar organizations.

As a whole, the routine discipline of the office staff is as good as can be expected where offices are open. Members of the uniformed force and others have practically free entry at any time and as a consequence the clerks have their attention distracted or become engaged in conversation to the detriment of their routine work. Some clerks report that owing to interruptions during the day, they frequently stay late after hours in order to bring their work up to time. Such interruptions would presumably be materially lessened by dividing the offices with low partitions or rails and restricting the public to a reception room at the entrance to the general office.

The individual employees are fairly punctual and the city office hours are adhered to. The order prohibiting smoking about the building appears to be generally recognized by the staff.

BUREAU OF CHIEF OF DEPARTMENT.

Staff, Etc.

THE actual office staff of the Bureau of Chief of Department consists of six clerks, one draughtsman, one stenographer and four messengers. The staff as it appears in the City Record consists of two clerks, one draughtsman and two stenographers.

Considerable changes have been made through details and transfers, so that the actual office force in the bureau consists of two clerks and one draughtsman permanently attached to the bureau, one stenographer detailed from the headquarters staff, one disabled captain from the uniformed force and three first-grade firemen, all four of whom are engaged on clerical work, and four first grade firemen detailed to the staff to act as messengers. The two stenographers officially attached to the bureau have been continuously detailed to other bureaus for several years.

The Chief Clerk who had charge of the running of the Chief's office, handling correspondence, reports, records, etc., for the last 12 years, was transfered in March, 1908, to Brooklyn headquarters. Elmer E. Kinney, a clerk receiving $1,650, or $750 less than the former incumbent was put in place of the former Chief Clerk. It will probably require many years' service before the new Chief Clerk is able to handle the work of the bureau as efficiently as the man displaced.

The records of the daily strength of all companies in the uniformed force are kept by Geo. H. Teller, clerk, at $1,350. Reports from every fire company are consolidated by the Chiefs of Battalions and forwarded to headquarters, where the information is transferred to several record books. The information filed by this clerk includes the movements of all members of the uniformed force, leaves of absence, reliefs of officers, men detailed to specific duties, and also a record of the department apparatus with changes of locations to which it may be assigned.

The draughtsman, Geo. S. Pentz, makes maps of the city showing locations of fire hydrants, water mains, fire alarm boxes, etc., and assists in arranging the assignments of companies and other work of similar nature.

The detailed captain and one of the detailed firemen have charge of the fire record journal and keep a full account of the fires which occur.

The other two first-grade firemen attend to keeping records of appointments, promotions, retirements, etc., of the uniformed force and keep the files of all communications, records, etc. One of the firemen, David J. Curley, attached to Engine Company No. 14, usually volunteers as an aide to the Chief at all serious fires occurring during the night time. Fireman Curley was ordered back to fire service on April 21, 1908. Through this change, made during the absence of the Chief of Department, work in the Chief's office is again hampered. Both Rosenthal, the former Chief Clerk, and Curley enjoyed the confidence of the Chief and had become efficient workers, through many years' experience in their positions.

BUREAU OF FIRE MARSHAL.

Organization and Personnel.

THIS bureau is under the supervision and management of the Fire Marshal, an officer appointed by the Fire Commissioner and removable only for cause. The work of the bureau is performed by the Fire Marshal and ten Assistant Fire Marshals, aided by a clerical force of three men. The Marshal receives a salary of $3,000 while his most experienced assistant receives $2,000. Three of the remaining assistants have salaries of $1,800, the others getting $1,500. Two clerks receive $1,500 each; the third member of the clerical force is both an interpreter and draftsman. His salary is $1,200. Four firemen and policemen were detailed to the bureau until recently, the details being revoked by Commissioner Bonner.

The present Fire Marshal, Peter Seery, entered the Fire Department in 1877, serving as an Inspector of Combustibles and was appointed Fire Marshal in 1898. In 1902 an attempt was made to remove Mr. Seery but he was reinstated two years later by the Supreme Court. Mr. Seery alleges that the removal was due to partisanship. He has passed his seventieth year, but still takes a decided interest in the work of his bureau.

Assistant Fire Marshals.

NAME.	APPOINTED	SALARY.
Thos. B. McGuire	Nov., 1899	$2,000
Jas. H. Lestrange	Aug., 1899	1,800
Peter R. Kilgallen	May, 1907	1,800
Herman W. deMalignon	July, 1898	1,800
Samuel B. Willis	Nov., 1899	1,500
John P. Prial	Dec., 1899	1,500
John McGough	July, 1900	1,500
Henry J. Hinck	May, 1907	1,500
Chas. O. MacCarthaigh	Sept.,1907	1,500
David J. Kelly	Feb., 1908	1,500

Duties.

The Fire Marshal is required to investigate all fires which cause loss, particularly those resulting from carelessness or incendiarism. It is also his duty to enter buildings and examine all heating appliances and other sources of danger from fire.

In the year 1907 ,the Fire Marshal secured 48 arrests for arson resulting in seven convictions. This number of arrests is decidedly above the average of previous years, while the number of convictions is about half the number of convictions secured in each year since 1902.

Action of Fire Marshal's Bureau.

YEAR.	ARRESTS FOR ARSON.	CONVICTIONS.
1903	29	12
1904	34	14
1905	57	14
1906	35	12
1907	48	7

Possible Improvements.

While the proportion of convictions secured to the number of arrests for arson is very small, there is no obvious method by which this condition can be radically improved.

Inasmuch as it is part of the duty of the Fire Department to prevent fires as well as extinguish them, it would appear proper for the Fire Marshal to assist in the prevention of fires if possible through the wider dissemination of the information secured by him in the course of his investigations. The Fire Marshal's

bureau has collected voluminous statistics on the causes of fires, which should be turned to account for the purpose of preventing future fires. Suggested channels through which the information might be utilized are, the public schools, architectural societies and journals, the daily press, the Department of Buildings, and State Factory Inspection and others. Although the last annual report contained a recommendation from the Fire Commissioner suggesting coöperation with the Board of Education along the lines suggested above, the Fire Marshal's office has not yet been called upon for any information by the Board of Education.

It is probable that fire losses could be materially lessened through closer coöperation between the insurance interests and the Fire Marshal. The Fire Marshal has more than once commented on the fact that insurance companies will continue to give insurance to many policy holders who have profited—sometimes repeatedly—from fires of suspicious origin. The fire situation would be improved if the information secured by the Fire Marshal regarding the origin of previous fires were utilized by the insurance companies before issuing further policies to certain policy holders of careless or unscrupulous character.

OPERATION: FIRE FORCE.

ENLISTMENT.

Requirements.

CANDIDATES for membership in the Fire Department have to conform to certain requirements established by the City Charter and to additional requirements as to size, etc., established by the Municipal Civil Service Commission. They must pass medical, physical and mental examinations—the physical and mental examinations being competitive—and must present proper vouchers for good character. If successful in filling all the requirements, their names are placed upon a civil service list of eligibles, those whose names stand at the head of the list receiving first consideration by the Fire Commissioner for appointment to the force.

The requirements under the City Charter are summarized briefly as follows:

1.—Must be a citizen of the United States.
2.—Unconvicted of felony.
3.—Able to read and write English understandingly.
4.—Citizen of New York State at least one year.
5.—Over 21 and under 30 years of age.
6.—Must reside in New York City while a member.
7.—Must not belong to any political club.

The minimum weight and height prescribed by the Civil Service Commission is 137 pounds and 5 feet 7 inches height with a minimum chest measure of 35 inches and with a mobility of 2 inches.

The medical requirements call for satisfactory condition of nose, mouth, teeth, arms, legs, hands and feet, eyes, ears, respiration, circulation, brain and nervous system. The applicant must be free from certain skin diseases and from evidence of intemperance in the use of stimulants or drugs. Body must be

well proportioned, of good muscular development and show careful attention to personal cleanliness. Obesity, muscular weakness, poor physique, rupture, varicose veins, and venereal diseases must cause rejection.

Some objection has been made by Fire Department officers to the comparatively poor physique of some recent appointees. While the members of the Civil Service Commission express themselves as ready to consider any reasonable suggestion from the officials of the Fire Department, it does not appear that the responsible officers have seriously urged changing the requirements in recent years.

It would, therefore, seem advisable to arrange for periodic conferences between the officials of the Fire Department and of the Civil Service Commission in order to correct any features of the requirements for eligibility which may produce undesirable results in practice.

Examinations.

Examinations for applicants to the fire force have been held in 1901, 1902, 1903, 1904 and 1907. Applicants fill out blanks stating their nativity, citizenship, etc., which blanks are obtainable only at stated times, just prior to the holding of each examination. Four residents of the city, of good character and standing, must vouch for the honesty, courage, sobriety and reputation of each applicant.

The Civil Service examination comprises two parts which bear equal weight in determining the fitness and standing of the candidates.

Physical Examination.—The examination for physical development and strength is made by the physical examiners. Credit is given for satisfactory measurements in regard to girth, depth of chest, depth of abdomen, girth of arms and legs and particularly muscular condition.

The strength of the applicant is tested by his ability to chin and dip a total of 20 times, to lift a 60-pound dumb-bell over his head with either hand, to rise to a sitting posture with a 35-pound dumb-bell behind his back, and to jump a maximum height of

4 feet 8 inches. The strength of the back, leg, and upper arm muscles are measured on testing machines.

Mental Examinations.—Those who have successfully passed the physical examination are required to take a mental examination. Candidates are given a simple memory test, three or four questions in ordinary arithmetic, and examinations to show their familiarity with the government of the city and the geography and the character of some one of the five boroughs selected by each candidate.

The questions presented in the latest examination for firemen, held February 7, 1907, were the following:—

Examination for Fireman, February 7, 1907, Municipal Civil Service Commission, New York.

MEMORY TEST.

Orders have come from headquarters to investigate a charge that an officer of this department interfered with a U. S. mail wagon at the fire at Broadway and Forty-second Street. You are directed to look into the matter at once and make a report without delay.

GOVERNMENT.

1. What matters are controlled by the Department of Water Supply, Gas and Electricity?

2. Name the City Departments having charge of
   (a) The inspection of steam boilers;
   (b) Public Markets;
   (c) Vaccination of school children;
   (d) Care of street lamps;
   (e) Public ferries;

3. What Government (Federal, State, County, City or Borough) has control of collection of the tariff on imported goods, murder trials, the building of a private residence in New York City, and the militia; also the cleaning of streets?

4. Give one reason in each case why the city finds it necessary to look after
   (a) Places where explosives are kept for sale;
   (b) Employment agencies;
   (c) Pawnbrokers;
   (d) Boilers in buildings;
   (e) The sale of milk.

5. From what City Official or Department must a permit or license be obtained for each of the following:

(a) To sell milk at retail;
(b) To conduct a newspaper stand under an elevated railroad station;
(c) To use blasting powder;
(d) To conduct a pawnbroking business.

Localities.

Take One Borough Only.

I. Manhattan.

1. What is the character of the buildings on the following blocks?
Broadway, 8th Avenue, 57th and 58th Streets;
Park Avenue, Lexington, 50th and 51st Streets;
44th to 46th Streets, east of 1st Avenue;
13th and 14th Streets, Broadway and 4th Avenue;
13th and 14th Streets, 9th and 10th Avenues.

2. Along what streets or avenues would a person pass in walking
(a) From the Hotel Astor (new) to the old Astor House;
(b) From the Astor House to the Waldorf-Astoria Hotel;
(c) From the Waldorf-Astoria to the Astoria Ferry;
(d) From Astoria Ferry to Astor Library;
(e) From Astor Library to Astor Theatre?

3. Locate by streets each of the following buildings and state what elevated railroad station is nearest to each:

(a) Normal College;
(b) Union Dime Savings Institution;
(c) Seventy-first Regiment Armory;
(d) Manhattan Opera House;
(e) New York Sub-Treasury.

4. Where are the following districts or neighborhoods? (Give boundaries as far as possible):

(a) San Juan Hill;
(b) Gramercy Park;
(c) Hell's Kitchen;
(d) Kingsbridge;
(e) Chinatown.

5. What sort of buildings will be found in the sections having the following boundaries? (Answer with special reference to character of building, that is, whether residence or business, fireproof or not, crowded or vacant, etc.):

(a) 41st and 43d Streets, 7th and 8th Avenues;
(b) 56th and 58th Streets, 5th and 6th Avenues;
(c) 22d and 23d Streets, 5th and 7th Avenues;
(d) 15th and 20th Streets, Broadway and Irving Place;
(e) 52d and 54th Streets, 8th and 11th Avenues.

II. Brooklyn.

1. What streets run about
   (a) East and West, between the East River and Court Street at Atlantic Avenue;
   (b) East and West between the East River and Newtown Canal on the North side of Greenpoint Avenue;
   (c) Northwest and Southeast between Broadway and Wyckoff Avenue at Putnam Avenue;
   (d) East and West between Nostrand and Schenectady Avenue at Bergen Street?

2. Give the routes of the following surface railroad lines:
   (a) Church Avenue line;
   (b) Marcy Avenue line;
   (c) Lorimer Street line.

3. Give the principal boundaries of the following:
   (a) Greenwood Cemetery;
   (b) Fort Greene;
   (c) U. S. Navy Yard;
   (d) Tompkins Park.

4. What is the distance in miles from Borough Hall to the following places:
   (a) Holy Cross Cemetery;
   (b) Bushwick Park;
   (c) Washington Cemetery;
   (d) Winthrop Park?

5. Locate the following:
   (a) Erie Basin;
   (b) Hanover Club;
   (c) Adelphi Academy;
   (d) St. John's College;
   (e) Kings' County Hospital.

III. Bronx.

1. Give the location, as far as possible, with the street boundaries, of each of the following:
   (a) Van Cortlandt Park;
   (b) Port Morris;
   (c) City Island;
   (d) Mott Iron Works;
   (e) Catholic Protectory.

2. At what station of the elevated railroad or subway extension would you get off so as to reach most conveniently

(a) The Commissioner's Office, Claremont Park;
(b) Lebanon Hospital;
(c) Fordham College;
(d) The Zoological Garden;
(e) Morris High School?

3. How would you travel, using street or steam cars, from Kingsbridge subway terminal to the office of the Coroner of The Bronx, and thence to the office of the Park Commissioner for the Bronx? Name every street used.

4. Name the streets used by the cars of
(a) The Port Morris line;
(b) The Sedgwick Avenue line;
(c) The Southern Boulevard line;
(d) The Tremont and Westchester line;
(e) The West Farms and Williamsbridge line.

5. Name at least four bridges stretching from The Bronx to Manhattan and specify the streets or avenues connected by each bridge.

IV. Queens.

1. Locate three different places in Borough of Queens where factories and tenement houses make the locality dangerous in case of fire.

2. State the places in the Borough of Queens where the City has already established the paid fire department.

3. Name five volunteer fire departments or companies which are now operating in the Borough of Queens.

4. (a) Name five stations of the Long Island Railroad situated in the Third Ward (former town of Flushing);
(b) Through what waters would you pass in sailing from Flushing Creek to Bayside?

5. Which of the following are manufacturing districts:
(a) Woodhaven, College Point, Auburndale, Ramblersville, Elmhurst, Astoria, Hollis, Hunter's Point, Creedmoor, Glendale?
(b) Give the most direct way of reaching those named by you from the Borough of Manhattan. If trolley is given, mention trolley line; if Long Island Railroad, give division and name of station.

V. Richmond.

1. By what bodies of water is Staten Island surrounded? Name all.

2. Name the lines of the Staten Island Rapid Transit Railroad and give their terminal points.

3. On which of these lines are the following towns: Princess Bay; Port Richmond; Rosebank; Snug Harbor; New Dorp?

4. Locate the following offices: President of Borough; Coroner; Board of Health; County Clerk; Tax Offices.

5. Locate the following highways and name the points connected by them: Richmond Turnpike; Clove Road; Amboy Road; Richmond Road.

ARITHMETIC.

Give all the figuring on the ruled sheets.

1. A man bought 9 shirts at 80 cents apiece; 2 ties at 35 cents each; 10 collars at 25 cents apiece; a pair of gloves for 75 cents; and 2 suits of underwear at 95 cents a suit. What did the man pay for them altogether?

2. If 895 miles of canal in the United States cost $541,475, what was the cost of each mile?

3. A grain dealer bought 2,480 bushels of wheat on Monday; 788 bushels on Tuesday; 1,565 bushels on Wednesday; 2,684 bushels on Thursday; 985 bushels on Friday, and 3,867 bushels on Saturday. How many bushels did he buy during the week?

4. If in one year the Fire Department of New York cost $9,750,684, and that of Chicago cost $4,690,853, how much more did one cost than the other?

In order to obtain a perfect mark of 100 per cent. on the examination, candidates must answer all the questions correctly. They are not given the privilege of selecting certain questions out of every group but must answer every question in each group, omitting only the locality questions concerning the four less familiar boroughs.

Should the candidate happen to be unfamiliar with any one of the 24 localities specified in the question of localities, his rating would suffer accordingly and the same is true with regard to knowledge of the several facts under the subject of "Government."

It follows from this that the ranking depends considerably upon the chance whether a candidate happens to be familiar with the individual subjects and locations selected by the examiners. If each candidate were permitted to select, say five questions out of each group of seven, there would be less probability of mere chance affecting his rating. At the same time the use of such a

method of permitting selections of questions from groups would result in grading intelligent candidates more nearly alike and would consequently throw greater weight upon the physical part of the examination as a whole.

As complaint has been made by several responsible officers as to the stamina of the men secured through the Civil Service examinations, it is believed that such a change in the mental examinations would result in improving the physique of the class of men eligible for appointment without lowering the standard of intelligence required. This change is in line with the present practice by which those candidates who receive a rating of 80 per cent. or more on physical development and strength, and a final average of 75 per cent. are eligible for appointment, even though their mental examination ratings may fall below the established minimum of 70 per cent.

Another change which it is believed would improve the quality of men secured is in returning to annual examinations. It is obvious that more desirable men in the aggregate would apply for admission to the department in three annual examinations than would be the case at a single examination held every three years. Also by holding an examination each year only the cream of the applicants would be selected in the course of the year, while under the system of longer intervals between examinations the appointing officer has to take men from further down the list.

Selection of Eligibles.

After the candidates have successfully passed the examinations, their names are published on the list of eligibles, arranged according to the ratings obtained at the examinations. When new members are to be appointed to the force, the Fire Commissioner is given the names of the men standing at the head of the eligible list, the number of names presented to him for consideration by the Civil Service Commission being at least 66⅔ per cent. in excess of the number of vacancies to be filled.

The choice of the Commissioner is further restricted in this list so that he has to appoint at least three out of the first five names, and roughly speaking three out of each succeeding five names. It is customary to select the names in accordance with

their standing on the eligible list, though exceptions are made in some cases at the discretion of the appointing officer.

It is reported that political districts are sometimes considered in making the selection.

Probationary Period.

New men when appointed are assigned to the downtown companies. They are required to attend the school of instruction for thirty days and during that time are liable to rejection if unsatisfactory. At the expiration of the thirty days they become permanent members of the department. It has been suggested that a probationary period of thirty days during which the men are for much of the time away from the companies to which they are assigned is insufficient to determine whether the new men are properly qualified to become good firemen. In some other cities it is the practice to keep new men on probation for as much as six months. During this time if any of the probationers fail to make a good showing at the school of instruction they are sent back to the school to repeat the course before being either permanently accepted or rejected. Such a procedure seems well adapted for weeding out the unfit, particularly when, as is sometimes done, company officers make systematic monthly reports as to the work and capabilities of the probationers assigned to their companies.

PROMOTIONS.

Charter Provisions.

PROMOTIONS in the uniformed force are made by the Fire Commissioner, subject to the restrictions imposed by Section 728 of the Charter. This section reads as follows:

> "The Fire Commisioner shall have power to select heads of bureaus and assistants and as many officers and firemen as may be necessary, and they shall at all times be under the control of the Fire Commissioner, and they shall perform such duties as may be assigned to them by him, under such names or titles as he may confer; provided, however, that assignments to duty and promotions in the uniformed force shall be made by the Fire Commissioner upon the recommendation of the Chief of Department, and in case any recommendation so made by the Chief shall be rejected, he shall,

within three days, submit another name or names, and continue so to do until the assignment or promotion is made. Promotions of officers and members of the force shall be made by the Fire Commissioner as provided in section one hundred twenty-four of this act on the basis of seniority, meritorious service in the department and superior capacity as shown by competitive examination. Individual acts of personal bravery may be treated as an element of meritorious service in such examination, the relative rating therefor to be fixed by the Municipal Civil Service Commission. The Fire Commissioner shall transmit to the Municipal Civil Service Commission in advance of such examination the complete record of each candidate for promotion."

Under this provision the Chief is required to recommend one name after another until a selection is made. At the same time by the operation of the Civil Service law, the Commissioner is limited in his choice in filling any vacancy to one of three names certified by the Civil Service Commission. As a result the provision of Section 728, giving the Chief of Department authority to recommend names for promotion loses its effectiveness and has become practically a dead letter.

Serious consideration should be given to the question whether the provision is a desirable one and should receive due recognition. As the Chief of Department is held responsible for the work of the uniformed force, it is certainly proper that he should be clothed with some authority in regard to recognizing merit among his subordinates by having a voice in the selections for promotion. At the same time it is recognized that the Commissioner must be the final appointing officer and that the rights of rival candidates for promotion must continue to be protected by the Civil Service requirements. To meet this situation it is suggested that the Chief of Department have the right to present three names for consideration for promotion to the Fire Commissioner, in filling each vacancy, and that one of these three must be selected by the appointing officer. It is further suggested that the Chief should be limited in his choice of names to the three names certified as at present by the Civil Service Commission but with the addition of the names of any other candidates who may have been previously passed over by the Commissioner, and whose rating on the list of eligibles is higher than those of the three men being

certified in due course. In this way the Chief could see to it that not more than one or possibly two well qualified men of high standing were deprived of promotion permanently by the Commissioner.

Rating Candidates for Promotion.

The Civil Service Rules prescribe that the ratings shall depend half upon written papers on pertinent subjects and half upon comparative conduct, seniority and efficiency in previous service, the two halves being given equal weight in determining the rating of each candidate. The Rules further provide that promotions shall be made one grade at a time with not less than one year's service in each grade. Some complaints have been made that the method of rating does not give sufficient weight to the executive ability and actual efficiency of the abler men. In the past men have received uniform rating for conduct, modified only by awards for meritorious service or by penalties inflicted as a result of charges. Thus if neither awards nor penalties appear on a man's record he receives a rating of 95 per cent. This figure is raised 1 per cent. for each commendation or honorable mention received and 2 per cent. when the appointee has earned a medal. The total credits are usually limited to five. On the other hand the rating is lowered one-half of one per cent. for each day's fine inflicted, except that fines imposed during the first half of the candidate's entire term of service affect his rating only to the extent of one-quarter of one per cent. for each day's fine instead of one-half of one per cent.

To secure a better basis of rating for previous service the Civil Service Commission in 1899 established the rule (Rule XV. Sections 7 and 8) that in each department or office continuous and permanent records of efficiency, character, and conduct should be kept of all persons employed in graded positions therein. "Such records shall be known as 'efficiency records' and the entries made therein shall have reference to (a) quality of work performed by each such officer or employee; (b) the quantity of work performed by him; (c) his general conduct; (d) his punctuality and attendance; (e) his executive ability and capacity for initiative, where his work is of a character that will permit definite estimation.

"The entries upon an efficiency record shall be made by the administrative officer most closely in touch with the work of the officer or employee to be rated, who shall be designated for such purpose by the appointing officer. Such entries shall be made monthly, and the following terms shall be employed to indicate the degree of efficiency: (a) Far above average; (b) above average; (c) average; (d) below the average; (e) far below the average. A transcript or summary of such record and all rewards or measures of discipline shall be furnished to the Commission annually and shall contain the certification of the appointing officer that such entries were made monthly; and whenever the Commission so requires, like certification of the full record of each candidate shall be furnished by the appointing officer in advance of a particular examination." The foregoing rule of the Civil Service Commission is reported to have been practically disregarded up to the beginning of the present year.

In January 1908 forms were sent to all commanding officers on which the efficiency records of every member of the Fire Department should be entered as called for in the above mentioned rule. The practice of the department, however, in the last three months indicates that little, if any, actual improvement will be secured in establishing thereby a true efficiency basis for promotion. It is reported that all members receive a uniform grading of "average" except when they have either received awards or suffered penalties such as would have affected their standing under the operation of the previous system. As a result it is likely that future efficiency records will be as colorless and devoid of proper grounds on which to rate a man's actual efficiency as they have been in the past. With all efficiency records comparatively uniform the written examinations then become by far the most important element in determining the rating of a candidate. While ability to pass a good written examination is a desirable qualification for a Fire Department officer, it ought nevertheless be secondary to his practical fire fighting efficiency and his ability to handle men to the best advantage. It is in regard to the latter qualifications of individual candidates that the opinions of the responsible superior officers are most valuable and it is for this reason, among others, strongly urged that the superior officers be given a voice in the selection of men for promotion.

In another part of this report the suggestion is made that all officers be given suitable opportunities to obtain instruction in the general principles and practice of engineering. In order to make such a plan effective, the examinations for promotion should recognize engineering knowledge as a requirement for eligibility to the higher positions, and such examinations should include questions on some of those engineering principles which are of direct value in strengthening the work of the Fire Department.

The character of the present written examinations is indicated by the sample questions submitted herewith, which were presented to candidates at the recent examination for promotion to assistant foreman, held September 26, 1907.

MUNICIPAL CIVIL SERVICE COMMISSION.

Promotion to Assistant Foreman.—Fire Department.

Rules and Regulations.

Date: Sept. 26, 1907.

1. A fireman who has been absent for a week without leave reports back and goes to work with the explanation that he had been sick. Is any rule violated? If so, under what circumstances could he go to work while the cause of absence is still being investigated?
2. What articles of property in possession of members of the uniformed force must be examined at each roll call, and what are the penalties inflicted for the loss of each of them?
3. What follows the order: "Stretch in"? What follows if a second line is required?
4. Describe the conditions which should be observed in regulating leaves of absence, so as to keep the fire company at all times in a thoroughly efficient state.
5. What are the regulations concerning the feeding and watering of horses that they may be kept in the best possible condition?

Laws and Ordinances.

1. (a) Name the styles or types of buildings in which fire escapes are required. (b) What notice must a manufacturer of fire escapes attach to his finished work? (c) In buildings requiring fire escapes, what provision is made by law for exit through scuttle or bulkhead, as the case may be?

2. Under what conditions are dealers in blasting materials permitted to employ persons to take care of and handle the explosives used in their business?

3. (a) What officers of the Fire Department, if any, have the right to enter buildings for purposes of inspection and at what times may such inspections be made? (b) What power have they to enforce compliance with laws or ordinances and what penalty is prescribed, if any, for failure to obey a fire department order?

4. A fireman detailed to the X. theatre finds adjustable or folding chairs attached to aisle seats. He orders their removal, but the proprietor of the house refuses on the ground that they are never used. What is the fireman's duty? Give reasons for your answer.

5. (a) How is the Life Insurance Fund of the Fire Department maintained? (b) To whom, and to what amount, and when are payments made from the Life Insurance Fund?

ADMINISTRATION.

1. Name the companies that would respond to a third alarm of fire at Claflin's, Church and Worth Streets, Manhattan, or at the department store of Abraham & Straus, Brooklyn.

(Answer one and not both.)

2. Describe the quickest and most effectual way in which you would get your company to work on a standpipe for a twenty-story building.

3. Explain how the "Salvage Corps" comes into contact with and cooperates with the Fire Department.

4. If a line burst between the fifth and sixth story of a six-story building, how should it be replaced?

5. On the way to a fire with your company, you find the streets blocked as the result of a collision between a trolley car and an automobile, both of which are on fire. Several persons, seriously injured, are imprisoned in the wreck and are urgently in need of assistance. In the absence of the police, what would you do under such conditions?

REPORT.

As Company Commander you ascertain that the walls in a certain building are cracked and in danger of falling. Make the necessary report to the proper official and recommend what steps should be taken to prevent accident.

Selection of Eligibles.

An inspection of the latest lists of eligibles for promotions shows that there has been no serious abuse of the competitive

idea by the appointing officer. For example, ten men have been promoted to the rank of Deputy Chief from the latest list of eligibles which was established in 1903. The first nine men who were appointed were those who occupied the nine leading positions on the list and the tenth appointee stood eleventh in rank on the list. From the latest list of eligibles for promotion to Battalion Chief forty-eight men were promoted. All of those who ranked among the leading forty-five received promotion. Eleven men were passed over, but of these eleven, eight were subsequently re-certified and promoted, leaving only three men finally passed over out of a list of fifty-one eligibles. One man, Captain Patrick Foley, was re-certified by special request on June 1, 1907, but failed to receive promotion ten days later when seven other Captains with lower ratings were promoted. On the list for foreman, established February 27, 1906, eighty-four eligibles have been promoted out of the first ninety-two names. Fifteen eligibles have been considered three times and were subsequently re-certified by special request and promoted. Four others all of whose names were among the lowest thirty presented for consideration have been passed over and have not been re-certified.

The latest list of eligibles for promotion to assistant foreman was established December 30, 1907. The late Commissioner Bonner in February 1908, promoted sixteen eligibles from this list. In making his selections, he passed over five names out of the first twenty-one considered.

A review of the foregoing figures shows that the privilege which the Commissioner has to pass over two out of every group of five names on the eligible list has not been abused in the recent past.

RETIREMENT.

A MEMBER may be retired on his own application after twenty years' continuous service, if the Board of Medical officers certify that he is unfit for fire duty. In such a case he receives half pay for life. Men totally disabled in service may retire on half pay after serving ten years. A man partially disabled in the line of duty may be retired on light duty with partial pay. There is no established age limit at which a man must re-

tire from active duty. It is suggested that the attention of the Charter Revision Commission be directed to two cases in which compulsory retirement were successfully fought by members of the force. The first of these was the case of the present Fire Marshal, who was re-instated by the Supreme Court in January, 1904, after being removed in 1902. As a result of the decision of the Supreme Court it becomes impossible for the Fire Commissioner to remove any officer of standing like that of the Fire Marshal against his will, except on charges. The position of Fire Marshal thus becomes practically a life position, without any provision for replacing the incumbent even when old age or other causes may seriously impair his efficiency. The second case referred to was the re-instatement of Captain Robert Oswald, now attached to Hook and Ladder Co., No. 16, but permanently detailed to light duty at headquarters on account of disability. The Board of Medical Officers certified that Captain Oswald was unfit for further duty and an attempt was made to retire him on half pay. The attempt was successfully fought by Captain Oswald who now receives the full pay of a foreman for doing light clerical work in the Chief's office.

Inasmuch as members disabled in the line of duty receive compensation at half pay after retirement, it would seem proper to place the decision as to retiring disabled members in the hands of the Fire Commissioner rather than leave it to the choice of the member directly interested. The Fire Commissioner is in the better position to know whether the city could afford to retain the services of a disabled man at an expense equal to the second half of his salary.

PERSONNEL.

IT has seemed advisable to restrict this report on the personnel of the Fire Department to such information as might be obtained from the official records of the department. Other sources of information have in several cases proved unreliable and contradictory. Furthermore, the efforts of your investigators were hampered by instructions sent from headquarters directing the members of the department to avoid touching on personalities when giving information to your investigators.

It appears from the records that with one exception every officer above the rank of foreman has served at least fifteen years in the department, thereby guaranteeing that the work of the department should be conducted under the supervision of thoroughly experienced men. The only chief officer with less than fifteen years' service is Battalion Chief H. P. Kirk, who was appointed to the department in September, 1893. The records at headquarters furnish the following additional information in regard to the individual records of the present chief officers:

RECORDS OF CHIEF OFFICERS.

MANHATTAN, THE BRONX AND RICHMOND.

	PROMOTED.	ROLL OF MERIT.	CHARGES.
Chief of Dept.			
CROKER, Edward F.	1884	1888—Without risk.	1890—Reprimanded.
Born 1863	1886	1898—With risk.	
Appointed ..1884	1893		
Dismissed...1902	1898		
Reinstated ..1904	1899		
Deputy Chiefs			
DUANE, WM.	1871	1891—Stephenson Medal.	
Born 1840	1881		
Appointed ..1868	1892		
	1899		
AHEARN, T. J.	1881	1885—With risk.	1877—Excused.
Born 1851	1886	1885 " "	
Appointed ..1873	1893	1890 " "	
	1900	1891—Bennett Medal.	
		1899—Without risk.	
		1901—With risk.	

KRUGER, C. W.	1877	1895—Stephenson Medal.	Fined 2 days' pay.
Born 1851	1895		
Appointed ..1872	1897		
Died.....1908	1903		
BINNS, JOHN	1884	1884—With risk.	1885—Reprimanded.
Born 1857	1884	1885—Bennett Medal.	
Appointed...1882	1897		
	1903		
LANGFORD, T. R.	1896	1893—Without risk.	1889—Fined 20 days' pay.
Born 1864	1898	1893 " "	
Appointed...1886	1901	1894 " "	
	1903	1896 " "	
		1896 " "	
CALLAGHAN, R. W.	1891		
Born 1863	1895		
Appointed...1885	1898		
	1906		
MCCARTNEY, J. J.	1887	1888—With risk.	
Born 1850	1895	1896—Stephenson Medal.	
Appointed...1884	1899		
	1907		
GUERIN, WM.	1894		
Born 1868	1896		
Appointed...1890	1897		
Resigned....1892	1900		
Reinstated ..1894	1906		

Battalion Chiefs

MARTIN, M.	1886	1899—Without risk.	
Born 1846	1897	1900 " "	
Appointed ..1873	1905		
SHORT, P.	1880	1885—With risk.	
Born 1850	1883	1886—Bennett Medal.	
Appointed ..1875	1886	1887—Without risk.	
Resigned....1887	1889	1888—With risk.	
Reinstated...1888(?)			
SHAY, C. H.	1878	1885—With risk.	
Born 1856	1878		
Appointed ..1877	1879		
	1879		
	1880		
TERPENY, E. F.	1882		
Born 1858	1886		
Appointed...1880	1894		
	1896		
	1900		
BROGAN, J. C.	1891		1882—Charge dismissed.
Born 1854	1898		
Appointed...1880	1907		

King, T., No. 1. Born.....1853 Appointed...1881	1883 1886 1898 1900 1905	1888—Without risk. 1895 " " 1898—With risk.	1882—Charge dismissed. 1887—Fined 2 days' pay. 1888—Fined 5 days' pay.
Sloan, P. Born.....1854 Appointed...1881	1889 1897 1903	1903—Stephenson Medal.	
Kane, T. F. Born.....1859 Appointed...1882	1890 1893 1905		1896—Charge dismissed. 1905—Charge revoked.
Barrett, T. F. Born.....1858 Appointed...1883	1889 1893 1903	1884—With risk. 1885— " " 1886—Without risk. 1897 " "	
King, J. F. Born.....1857 Appointed...1883	1897 1900 1903	1885—With risk. 1888 " " 1899—Without risk.	1888—Fined 2 days' pay.
Andrews, P., Jr. Born.....1863 Appointed...1884	1897 1901 1907	1897—Without risk.	
Duffy, Wm. J. Born.....1862 Appointed...1884	1897 1900 1906	1889—Without risk. (?) 1898 " "	
Gray, F. J. Born.....1859 Appointed..1884	1891 1896 1897 1902	1890—Without risk.	
Devanny, J. F. Born.....1856 Appointed...1884	1892 1897 1903	1902—Stephenson Medal.	
Skelly, T. F. Born.....1862 Appointed...1884	1892 1898 1906	1897—With risk.	1891—Fined 1 day's pay. 1892—Reprimanded.
Conlon, J. B. Born.....1858 Appointed...1885	1898 1900 1906	1893—Without risk. 1905-Stephenson Medal.	1890—Fined 1 day's pay.
Beggin, W. T. Born.....1864 Appointed...1886	1895 1898 1903	1896—Without risk. 1903 " "	1889—Fined 1 day's pay. 1890—Fined 10 days' pay. 1903 — Judgment rescinded and charge filed.

ROOT, E. S.	1887	1895—Without risk.	
Born.....1857	1898	1897 " "	
Appointed...1886	1901		
	1903		
WORTH, E. J.	1897	1896—Without risk.	1890 — Reprimanded.
Born.....1861	1901	Stephenson Medal.	
Appointed...1888	1905		
HOWE, J. P.	1897	1894—With risk.	1890—Fined 3 days' pay.
Born.....1868	1900	Pulitzer Medal.	
Appointed...1890	1903	1896—Without risk.	1890—Laid over.
		1896 " "	1890—Fined 10 days' pay.
		1899 " "	
		1897—Bonner Medal.	
		1900—With risk.	
		1900—Without risk.	
		1897—With risk.	
GRAHAM, P. J.	1897		1892—Suspended.
Born.....1867	1901		1893—Fined 2 days' pay.
Appointed...1890	1907		1895—Fined 3 days' pay.
			1903—Reprimanded.
			1903—Charges dismissed.
			1906—Fined 3 days' pay, fine remitted.
HAYES, T. J.	1897		
Born.....1868	1900		
Appointed...1891	1904		
CRAWLEY, JOSEPH	1893	1899—With risk.	
Born.....1869	1897	1900—Without risk.	
Appointed...1891	1900	1903—Class E.	
	1905		
KENLON, JOHN	1892	1896—With risk.	
Born.....1860	1897	1898 " "	
Appointed...1887	1900		
	1903		
NORTON, T. F.	1895	1904—Class A.	
Born.....1859	1900	1905-Stephenson Medal.	
Appointed...1887	1906		
O'CONNOR, J. A.	1897	1903—Class D.	1906—Fined 1 day's pay, fine remitted.
Born.....1865	1900		
Appointed...1888	1906		
DOUGHERTY, T. F.	1895	1903—With risk.	
Born.....1865	1896		
Appointed...1888	1903		
ROSS, G. L.	1894	1902—With risk.	
Born.....1866	1897		
Appointed...1888	1900		

FARRELL, GEO. F.	1887		
Born.....1855	1891		
Appointed...1880	1900		
McKERNAN, O.	1899	1895—Without risk.	1905—Charges dismissed.
Born.....1869	1901		
Appointed...1892	1907		
GALVIN, B. J.	1899	1904—Class D.	
Born.....1870	1901		
Appointed...1893	1906		

Veterinary Surgeon

SHEA, JOSEPH	1884		
Born.....1847	1893		
Appointed...1884			

RECORDS OF CHIEF OFFICERS.

BOROUGH OF BROOKLYN AND QUEENS.

	PROMOTED.	ROLL OF MERIT.	CHARGES.
Deputy Chiefs			
LALLY, THOS.	1873	1874	1879—Charges dismissed.
Born.....1847	1881	1877	
Appointed...1870	1884	1822	1880—Charges dismissed.
	1900	1891	
	1904	1891	1881—Reprimanded.
		1899	
MURRAY, JAS. F.	1881	1899—With risk.	
Born.....1851	1894		
Appointed...1878	1898		
	1902		
BURNS, J. J.	1886	1894—With risk.	
Born.....1861	1894	1897 " "	
Appointed...1883	1898	1903—Class D.	
	1903		
GOODERSON, F.W., Jr.	1880	1903—With risk.	
Born.....1856	1883	Class B.	
Appointed...1879	1884		
	1897		
	1903		
DUFFY, F. J.	1889	1893	
Born.....1855	1892		
Appointed...1880	1899		
	1903		
MARTIN, J. B.	1889		
Born.....1861	1893		
Appointed...1884	1900		
	1906		

O'Hara, J.	1887		
Born.....1859	1889		
Appointed...1882	1897		
	1898		
	1907		
Donohue, J. J.	1896	1899	
Born.....1860	1900	1900	
Appointed...1889	1906		
Reilly, James	1896		
Born.....1862	1900		
Appointed...1885	1906		
Hauck, L. T.	1896	1903—Class D.	
Born.....1863	1902		
Appointed...1891	1907		
McKenna, E. J.	1897	1904—Class D.	
Born.....1865	1900		
Appointed...1891	1907		
Larkin, T., No. 2	1890	1886—With risk.	
Born.....1857	1897	1893 " "	
Appointed...1884	1903	1896 " "	
		1887—Strong Medal.	
		1900—Stephenson Medal.	
		1906—Class B.	
		1907—Class A.	
Murphy, John	1884		
Born.....1846	1896		
Appointed...1880	1900		
Cummings, J.	1891	1893	1885—Reprimanded.
Born.....1863	1894		
Appointed...1885	1900		
Dooley, J. J.	1887	1884	
Born.....1857	1889	1891	
Appointed...1881	1902	1894	
		1894	
Clark, Wm. C.	1893		
Born.....1861	1897		
Appointed...1884	1902		
Rogers, Wm. C.	1887	1894	1901—Reprimanded.
Born.....1861	1895		
Appointed...1885	1903		
Matschke, B. H.	1894	1892	
Born.....1865	1896	1895	
Appointed...1890	1903	1895	
		1898	
Smith, M. J.	1897	1891	1902—Charges dismissed.
Born.....1867	1900	1894	
Appointed...1890	1907		

STONE, CHAS. H. Born.....1863 Appointed...1885	1886 1893 1900 1906	1899—Without risk.	
WACKERMAN, H. Born .....1860 Appointed...1887	1891 1894 1907	1887	1890—Fined 5 days' pay. 1894–Seven Ch'ges, all dismissed. 1902—Charges dismissed. 1905—Reprimanded. 1906—Reprimanded.
KIRK, H. P. Born .....1870 Appointed...1893	1896 1900 1905	1895 1896 1899 1897 1903—Class E.	1894—Fined 1 day's pay.
FARRELL, J. T. Born .....1862 Appointed...1887	1896 1900 1905	1888 1903	
MAHER, PA. Born .....1863 Appointed...1886	1889 1891 1898 1903	1902—With risk. 1903—Class B.	1888—Fined 3 day's pay and reprimanded. 1895—Reprimanded. 1902
GRAHAM...M. E. C. Born .....1861 Appointed...1882	1895 1896 1903	1884—With risk. 1885 " "	1883—Reprimanded.
HAUCK, H. Born .....1866 Appointed...1889	1897 1901 1905	1895—With risk.	1890—Fined 1 day's pay. 1891—Fined 5 days' pay.
LAWRENCE, WM. E. Born .....1868 Appointed...1890	1897 1901 1906	1899—Without risk.	
LANGAN, JAMES Born .....1861 Appointed...1887	1894 1900 1906	1888 1892	
MCGUIRE, PAT Born .....1854 Appointed...1883	1891 1894 1906		1885—Fined 5 day's pay.
LUCAS, P. F. Born .....1860 Appointed...1887	1894 1896 1903	1890—Without risk. 1891—With risk. 1891—Without risk. 1893—Bennett Medal. 1895—Without risk.	1890—Reprimanded. 1902—Charges dismissed.

McCarthy, Wm.	1885	1894	1878—Reprimanded.
Born 1847	1892		1890— Reprimanded.
Appointed...1873	1898		
Kellock, Jas.	1885	1895	
Born 1847	1896		
Appointed...1871	1898		
Norton, Ed. J.	1889		
Born 1854	1891		
Appointed...1879	1897		
	1898		
Heard, E. H.	1899		
Veterinary Surgeon			
Born 1848			
Appointed...1886			
Nevins, Pat.	1882		
Supt. Repair Shop			
	1891		
Born 1852	1899		
Appointed...1875			

PART II

OPERATION: Fire Methods

OPERATION: FIRE METHODS.

INTRODUCTORY.

THE primary object of the Fire Department is to prevent fires from spreading and to extinguish them with as little loss as possible. To attain this object, the best available means is the prompt and effective application of water in sufficient quantities.

To obtain sufficient water from an inadequate distribution system and throw it quickly and effectively upon any fire which may arise is an engineering problem which for its proper solution calls for a high degree of engineering skill.

This one problem involves the organization, equipment and operation of the Fire Department. In working out its solution certain rules and regulations have been established for the guidance of the department and certain fire methods have come into regular vogue. The handling of this problem is so vital to the practical efficiency of the Fire Department that every technical phase of the question should be fully and carefully studied.

WATER SUPPLY.

THE work of the department is first of all dependent upon the character of the water supply. While the principal mains carry sufficient water for satisfactory fire service into some parts of Manhattan, yet the inadequate size of many minor distributors, and the inferior types of hydrants used, combined with the low pressure normally maintained on the Manhattan low service, together result in preventing the fire engines from getting an adequate supply of water at many serious fires.

In regard to existing hydrants and their supplies, reliable tests were carried out in 1905, by the corps of able engineers employed by the National Board of Fire Underwriters. As a working basis for those tests it was assumed that six second size fire engines were to take water from six adjacent hydrants in groups

throughout the city. An analysis of the tests showed conclusively that not more than 42 per cent. of the hydrants tested could be depended upon to furnish a fair to good supply for a second size engine, while five other second size engines were taking water from neighboring hydrants. That is to say, the tests showed that in a majority of cases at least one out of six second size engines attached to neighboring hydrants anywhere in Manhattan would be unable to obtain an adequate supply of water.

When the number of engines is increased to twenty or more with a considerable number of first size engines in the list, the inadequacy of the water distribution system becomes more startlingly apparent.

In substantiation of these statements, reference is made to the report issued by the National Board of Fire Underwriters, Committee of Twenty, in November 1905, on the City of New York, Manhattan and the Bronx. (See pages 20, 24 to 29, 31 and 32.)

For further substantiation the following conditions have come under the personal observation of the writer.

Ridley Building Fire. Grand Street, April 25, 1905.

At this fire nineteen engines worked. Total combined rating of engines, 15,550 gallons per minute. Total gallons actually discharged per minute during the height of the fire, 4,900 gallons per minute, or 258 gallons per engine. This may be compared with the total rate of discharge observed at a fire in another city having an ample water supply where eighteen engines discharged 7,876 gallons per minute. At the Ridley Building fire, the writer observed three engines drafting their water from hydrants at atmospheric pressure or less, which indicated that these particular hydrants had reached approximately their maximum discharge. The streams played by the three engines last mentioned aggregated 890 gallons per minute, an average of slightly less than 300 gallons per minute from each hydrant. Several engines were reported dismissed from this fire by the Chief of Department before it was put out, because of their inability to obtain sufficient water to make their services of value.

For adequate fire service one progressive city has for many years been installing mains and hydrants on the basis that each hydrant in the business districts should be able to furnish 2,000 gallons per minute while eight or ten neighboring hydrants are subjected to a similar draft.

Wooster Street Fire. December 25, 1905.

Scarcity of Water.—Of the twenty-six engines called to this fire, seventeen were either observed in operation by engineers of the National Board of Fire Underwriters or visited soon after shutting down. In the latter cases, the men in charge of the engines were questioned in regard to the sufficiency of water obtained from the hydrants. Engines Nos. 20, 27 and 33 were found to have deficient water during the period of maximum draft, while Engines Nos. 55 and 9 which were observed soon after the period of maximum draft had not sufficient water even under the more favorable conditions. Engine No. 55 attempted to fill two lines, but was forced to shut off one of them, owing to the lack of water supplied by the hydrant.

Three hydrants on the east side of Greene Street north of Spring Street which were tried were found wanting, and Engines Nos. 15 and 72 were moved from these locations. Engine No. 33 while attached to the third of these three hydrants was furnished with an auxiliary water supply from Engine No. 25, but the combined supply proved inadequate. Engine No. 13 reported insufficient water at time of maximum draft. This engine was stationed at a hydrant which proved incapable of supplying more than 500 gallons per minute when the same engine was connected to it for testing purposes early in the previous summer. Engineers of Engines Nos. 27 and 31 also reported insufficient water supply while other engines were at work, the supply improving later.

Engines 3, 6, 11, 14, 15, 18, 21, 25, 30 and 72 reported sufficient water.

In general the engines were run at low speed and most of them filled but a single line. The total discharge from the twenty-six engines combined at period of maximum draft was estimated by the National Board engineers as being less than 8,000 gallons

per minute or not more than 300 gallons per engine. The majority of the engines present at that fire were rated at 900 gallons per minute capacity.

Bedford Street Fire. March 26, 1906.

At the serious and extensive fire on Bedford, Downing and Carmine Streets, the writer noticed several engines which were unable to obtain an adequate supply of water from the hydrants to which they were attached. In particular Engines Nos. 25 and 30 which were stationed on Downing St., were both unable to obtain sufficient water although each of them, when observed, was attempting to fill but a single line of hose. Engine No. 19 also when observed was unable to obtain sufficient water to fill a single line satisfactorily.

Parker Building Fire. Fourth Ave. and 19th Street, January 10, 1908.

During the critical period of this fire the writer carefully inspected the work of nine different engines. Four of the engines when inspected were standing idle, and were consequently at that time causing no draft on the water supply. The other five were running at considerably less than two-thirds of the speed necessary to discharge their full capacity of water. Under these conditions the fact that two out of the five working engines, Nos. 55 and 72, were drafting their water under a vacuum from their respective hydrants indicates the inadequacy of the water distribution system.

The inadequate supply of water demonstrated above at many—if not most—points throughout the city adds greatly to the difficulty of the problem confronting the Fire Department, and calls for the application of greater engineering skill to obtain the best results. The deficiency is so serious and threatening that the Fire Department should spare no efforts to secure permanent improvements in the distribution system both as regards size of mains and the types of hydrants. The situation also calls for an improved method in the arrangement of engines in the neighborhood of threatening fires and in the selection of proper hydrants.

SELECTION OF HYDRANTS.

THE testimony already taken in the present investigation indicated that the proper location of engines at hydrants rested primarily upon the company officers and that the chief officers disclaimed any responsibility in the matter. In view of certain Special Orders which had been issued to the department, however, the responsibility should be shifted from the shoulders of company officers to those of the Chief of Department who is responsible for the orders. The Rules and Regulations of 1905 simply state that "on arriving at a fire, commanders of engine companies will immediately order a connection to be made to the hydrant, unless it appears to those having the longest distance to travel that their services will not be required, and report before stretching in."—Section 249. It will be observed that this section does not instruct company officers in regard to what hydrants should be selected. This point is more nearly covered by Paragraph 2, of Special Order No. 76 issued July 1, 1904, as follows:

> "In the future, upon receipt of second alarm of fire, companies due on second alarm will make connection to engines already working at fire (and which responded on first alarm) in such streets that are wide enough and will not obstruct traffic.
>
> "The practice of taking hydrants so far away from a fire and making long stretches of hose will be discontinued. These connections can readily be made from one engine to another by using suction and obtaining the same results as to water pressure.
>
> "By order of
>
> "EDWARD F. CROKER, *Chief of Department.*"

This Special Order was reiterated and reaffirmed on March 16, 1905, by Special Order No. 32 in the following terms:

> "The attention of commanding officers of companies is hereby called to the necessity of their taking hydrants as close as possible to the scene of a fire, thus avoiding long stretches, as on several occasions recently I observed that as many as five hydrants in close proximity to building on fire were not taken by companies.
>
> "In connection with the above the attention of commanding officers is hereby called to the provisions of Special Order No. 76, Paragraph II, from this office, dated July 1, 1904, and such orders will be strictly obeyed in the future.
>
> "By order of,
>
> EDWARD F. CROKER, *Chief of Department.*"

Still further to impress officers with the necessity of attaching to all hydrants nearest to a fire, the following notice was sent to all Chiefs of Battalions as recently as December 10, 1907.

OFFICE OF CHIEF OF DEPARTMENT,
NEW YORK, December 10, 1907.

"CHIEF OF BATTALION.

"You are hereby notified and will notify all officers in your battalion that I have observed at recent fires that absolutely no attention has been paid to provisions of the Rules and Regulations and orders issued from this office under date of July 1, 1904, Special Order No. 76, and to Special Order No. 32, March 16, 1905, calling attention to Special Order No. 76 relative to taking hydrants so far away from the scene of a fire, necessitating long stretches; that in such cases connection could readily be made from one engine to another by using suction.

"In future any failure to comply with the above orders will be made the subject of proper action.

"By order of
EDWARD F. CROKER,
"Chief of Department."

On February 19, 1908, in General Order No. 1 the Chief of Department referred once more to the Special Order of July 1, 1904, quoted above, but in this case he added to the former directions the injunction that company commanders and engineers of steamers should study hydrants and sizes of mains so as to obtain the best results. This order was issued after the Commissioners of Accounts had submitted their preliminary report on the Fire Department investigation. The portions of General Order No. 1 of 1908 bearing on the matter of selecting hydrants are given below:

"HEADQUARTERS, FIRE DEPARTMENT, CITY OF NEW YORK,
"Office, Chief of Department,
"NEW YORK, February 19, 1908.

"GENERAL ORDERS

"No. 1.

"The attention of members of this department, ALL RANKS AND GRADES, is hereby called to the fact that for several years past it has been necessary to issue various order from both the office of the Fire Commissioner and this Bureau, promulgating additions and amendments to the Rules and Regulations, orders instructing

members as to the observance of proper discipline, etc., etc., the provisions of which I am compelled to state have in many cases not been given proper care and attention, resulting very often in lowering the standard of efficiency and seriously affecting discipline.

"In the future the slightest infraction in the proper observance of the Rules and Regulations now in force or of the various Special, and General Orders coming to my notice, upon the part of members of any rank or grade will be made the subject of the severest penalties possible under the law to impose, without further notice.

"In connection with the above General Order, the provisions of various orders as enumerated herein below are hereby called to the attention of the uniformed force, and will be read semi-monthly at Roll Call, and a strict observance enjoined upon all.

. . . . . .

"Special Order No. 76, July 1, 1904.—The practice of taking hydrants so far away from fire, necessitating long stretches of hose. In this connection it has come to my attention that first alarm companies pass hydrants near the scene of the fire and for apparently no good reason take hydrants furthest away, although located on the same main. COMPANY COMMANDERS and ENGINEERS OF STEAMERS are hereby enjoined to make a thorough study of different hydrants and the sizes of mains on which they are located in their own and ADJOINING districts to which they respond on first, second and third alarms for fire, so as to obtain the best results possible from a standpoint of getting at the nozzle the best possible pressures. Companies after stretching in at fires will fix their hose so as to lay on ONE side of the street, leaving the center of street open for the passage of apparatus.

. . . . . .

"Orders to Chiefs of Battalions December 10, 1907.—Relative to taking hydrants so far away from scene of fire, necessitating long stretches.

. . . . . .

"By order of
EDWARD F. CROKER,
"*Chief of Department.*"

The earlier Special Orders if strictly obeyed would almost surely result in cutting down the amount of water obtained by many of the engines more seriously even than has occurred in the past. This disastrous result is of course due to the inadequate distribution system. If the distribution system had been laid out along proper lines for furnishing an adequate supply of water at any point where it might be required, the instructions contained

in the Special Order of July 1, 1904, March 16, 1905, and December 10, 1907, would be properly adapted to obtain the best results at any serious fire. But in view of the existing layout of the distribution system the above mentioned Special Orders cannot fail to result disastrously. The modifications of the earlier orders issued on February 19, 1908, while it should improve the situation somewhat, can still be further amended. Officers of companies reaching a fire on third or greater alarms cannot be expected to know which hydrants have already been taken by other companies, and as this knowledge is vital in selecting the best of the hydrants which are left, these officers are thereby forced to make a selection in partial ignorance of the situation. Under these circumstances it is to be expected that mistakes will continue to be made in the selection of hydrants inasmuch as late arriving companies will be apt to place their engines at certain hydrants without regard to the probable effect of such selection in cutting down the supply of water to engines already at work. A better method would be to place the responsibility for the proper location of the engines upon some individual officer; for example, either the chief in command or an aide designated by him who would make it his business to keep track of the hydrants already occupied by the engines and the sizes of mains in the immediate neighborhood.

In a general way, if there is any question of deficiency of water supply, late coming engines should be instructed to attach to hydrants on large mains sufficiently remote from the fire to avoid seriously reducing the supply of the engines already at work. To render the services of engines stationed at considerable distances fully effective calls for a change from the present practice in regard to stretching in lines of hose; and also requires additional equipment. The present practice appears to be based on the assumption that the water supply and the water distribution are both adequate, an assumption which threatens at any time to cause disastrous results.

The present defective conditions should be recognized and intelligent steps taken to meet them. A simple and obvious step towards making the proper selection of hydrants easier for companies responding to a fire would be to mark each hydrant con-

spicuously with the size of the main to which it is attached. This step, however, does not go far enough, for there are certain conditions under which a hydrant on a small main might be preferable to another hydrant on a considerably larger main. The proper marking of hydrants so as to indicate clearly those having sufficient water supply is a problem which should be left to trained engineers who are capable of appreciating all of the elements which enter the situation.

Use of Too Remote Hydrants.

In some cases mistakes have been made through selecting hydrants too remote from a fire while the water supply in the vicinity of the fire is adequate. This was illustrated at the recent Joy Line Pier fire on March 30, 1908. At this fire Engine No. 29 was stationed at a hydrant over 1,000 feet away, while it might have been located to better advantage on the river front within 100 or 200 feet of the fire, so as to obtain an unlimited supply of water directly from the river. The distance at which it was located required a water pressure of nearly 200 pounds to be maintained which early resulted in bursting the hose. The friction in the long line of hose absorbed more than three-quarters of the entire power developed by the pumps and cut down the amount of water discharged to approximately one-third of the full capacity of the engine.

ATTACHING TO HYDRANTS.

Size of Connection Used.

SECTION 171 of the Rules and Regulations of 1905 directs each engineer of steamer: "Upon reaching a hydrant in the vicinity of the fire, connect the suction or hydrant connection to the hydrant, then to engine; be sure the connections are airtight. Companies reporting on extra alarms will always use the suction."

This provision apparently leaves it discretionary with the engineers of first alarm engines whether to use the small hydrant connections or the larger suctions. Experience proves that the use of small connections reduces the pressure of the water received from the hydrant materially more than does the use of large size

suctions. In fact certain engines with which the writer is familiar are equipped by their builders exclusively with 4½-inch and 6-inch suctions instead of the 2½-inch and 4½-inch sizes carried by the New York engines. In view of the low pressure in the mains throughout a large part of Manhattan, a pressure which is still further reduced by the inferior types of hydrants now in service, it appears to be poor engineering to cut the pressure down still further by using hydrant connections of small diameter when larger connections are available. Of course it is recognized that promptness is an essential feature in handling fires. For this reason the use of small connections by the first engine company arriving at a fire might be justified, but all subsequent engine companies should be instructed to make use of the larger size suctions if there is any probability of the fire becoming serious.

Choice of Hydrant Outlets.

What has been said in reference to the use of large and small size suctions applies also to the selection of 4½-inch hydrant outlets when available. The writer has noted the tendency to utilize the small 2½-inch hydrant outlets sometimes even when the large sized 4½-inch suctions are used. At the Parker Building fire most of the engines in the immediate vicinity of the building were connected to 2½-inch outlets. At the Worth Street fire of February 4, 1908, Engines Nos. 7, 27 and 31—out of the few engines observed by the writer—were connected to hydrants by small sized connections, Nos. 27 and 31 using small outlets of double hydrants where the large outlets were available. At the second alarm fire on Second Avenue corner 20th Street, February 23, 1908, Engines Nos. 14 and 16 both used small connections attached to the smaller outlets of double hydrants.

OPERATION OF ENGINES.

Streams to be Furnished.

SECTION 156 of the Rules and Regulations prescribes that "the engineer of steamer will be held responsible for the condition and proper running of the engine, and shall furnish a good and sufficient stream of water when required; shall not

cause or allow the destruction of tubes, coils, or boiler or any other part of the machinery by lack of water in boiler, by freezing or any cause, and if any of the parts are out of order, or if anything is wanting, he will be held responsible until the same is reported to the comanding officer of the company."

It will be seen from the foregoing that the engineer of steamer is called upon to " furnish a good and sufficient stream of water when required." Nothing appears in the Rules and Regulations in regard to two streams, and yet it is generally understood that every engine suitable for use in a built-up community should be able to supply continuously two effective fire streams. Several engines in the New York department are of too small size to supply two streams. Many others of ample size have been found at tests to be in such poor condition or so poorly handled that they also were unable to pump enough water for two effective streams.

In cities where two streams per engine is the rule rather than the exception, a small number of engines is required to handle any given fire effectively, with the result that the average distance of the engines from the fire is materially lessened with corresponding increase in efficiency, while fewer engines are drawn away from the protection of other localities.

Although two lines of hose are sometimes seen attached to a single engine at serious fires in New York, yet this practice is decidedly the exception rather than the rule.

Of course, if an engine were attached to a hydrant on a main supplying insufficient water, the attempt to play two streams should not be encouraged; but if a suitable hydrant located on a main of ample size is selected, each engine of the two larger sizes might advantageously be called on to furnish two effective streams.

Speed of Engines at Work.

In filling two streams an engine must run at considerably higher speed than when playing but a single stream. Most engines of modern design when in good condition can maintain a speed approaching 300 revolutions per minute under service conditions. The writer has records of engines working at fires at speeds of 350 revolutions per minute and over. Such speeds are

practically unheard of in the New York Fire Department. A speed of between 100 and 120 revolutions per minute is a frequent occurrence in New York, and the average speed of engines working at fires is apt to be in the neighboorhood of 150 revolutions per minute.

Slip of Pumps.

The speed of the engine, however, is not always a sure guide to the amount of water the engine may be pumping. If some of the pump valves are defective or if other valves are left unclosed, the engine will suffer from what is known as a high percentage of slip and a considerable proportion of the water which should be discharged at the nozzle will be wasted through the disordered valves. The question of slip becomes an important one when fully efficient service is required of the engine. For practical purposes "slip" is equivalent to "waste" and a high percentage of slip argues poor maintenance on the part of those responsible for the engine.

Although the question of slip is a very important one, in that it affords a direct indication as to the condition of an engine, the writer has been unable to learn that any systematic tests have been made by the department engineers to ascertain the slip and condition of the engines from time to time. Conversations with various engineers of steamers indicate that the latter are generally unaware of how the slip of an engine can be measured and what it indicates. The way some engines work at fires leads to the belief that excessive slip is present. Excessive slip may play a noticeable part in diminishing the effectiveness on a fire of a stream from any engine.

Size of Streams.

The capacity and power of similar engines in different cities is to some degree reflected by the sizes of streams which they are accustomed to play upon serious fires. In New York the writer is unable to recall any stream larger than 1½-inches played by a single engine. In other cities his records show frequent use of 1⅝-inch, 1¾-inch and 2-inch streams, each of them effectively supplied with water by a single engine.

In handling a serious fire an ample quantity of water is wanted

in each stream, in combination with adequate stiffness in the stream. This desirable combination calls for competent handling on the part of engineers as well as good condition of the engines and adequate water supply. The reverse of all these conditions was illustrated at the Parker Building fire in the streams from both the deck pipe and the tower nozzle of the water tower on Fourth Avenue, as well as by the siamesed stream when it was first directed against the Parker Building from the American Lithograph Building.

Steam Pressures.

Section 162 of the Rules and Regulations directs each engineer of steamer to "set the safety valve to lift at a pressure of 80 pounds per square inch, once in three months remove the valve from the chamber and clean off any corrosion that may have accumulated on the guide."

This rule is either worth preserving in the Rules and Regulations, or it is not. The writer believes that with the boilers kept in good condition there is no proper reason for the existence of such a rule, and he further believes that its existence on the books leads to its being regarded as a dead letter and thereby induces laxness in carrying out the other rules and regulations established for the guidance of the force. That this rule is frequently violated is shown by the following personal observations: At the Parker Building fire the writer observed the steam pressures on but four engines; three of these held steam pressures of approximately 120 pounds, while the steam pressure on the fourth was 96 pounds.

At the Worth Street fire on February 4, 1908, the steam pressure on most of the engines observed by the writer was in excess of 80 pounds.

At the Ninety-sixth Street and Second Avenue car barn fire on March 1, 1908, eight out of ten engines observed maintained steam pressure in excess of 80 pounds.

Inasmuch as Regulation 162 appears to be violated by a large proportion of engineers at every serious fire, it would appear the part of wisdom to modify the rule so that it may better accord with practice.

Water Pressure Maintained by Engines.

The following Rules and Regulations bear on the water pressure to be maintained by the engines while in service at fires:

Section 173. "The relief valve in main pump will be set to lift at a pressure of 75 pounds per square inch, but in case this pressure is not sufficient for the work to be performed, such as forcing water through a long line of hose or pipe in an elevated position, or when the full power of the engine is required, the pressure will be increased by the order of the Commanding Officer, the churn valve and sprinkler will be closed and relief valve will be cut out, the pipeman will be notified of the fact, and if a controlling nozzle is on the pipe it will not be shut off until the order has been sent and pressure reduced on the line."

Section 335. "The water pressure on a line of 3-inch hose, when the engine is working on the relief, shall not exceed 60 pounds. Should more pressure be required, the controlling nozzle on pipe will not be shut off until the pressure is again reduced on the line."

Section 337. "When high pressures are required, the controlling nozzles will not be used on the line, as each company is supplied with different sizes of open nozzles, which must be used when the pressure on the line exceeds 60 pounds."

It is difficult to understand why a limit of 60 pounds is set when 3-inch hose is used. Three-inch hose is properly brought into play only when the friction of a 2½-inch line would cut down the effectiveness of its stream. In other words 3-inch hose should be employed primarily only when a long line is necessary or when a large quantity of water is to be discharged. Either of these conditions is almost sure to require a much higher water pressure at the engine than 60 pounds so that if the engineer attempted to abide by the 60 pound limit, the resulting stream would almost surely be unsatisfactory. The rule requiring open nozzles only to be used when the pressure is in excess of 60 pounds is presumably intended to save the hose from great pressures developed by suddenly closing the controlling nozzle. In other departments it has been found practicable to use controlling nozzles on any line even with the automatic relief and churn valve closed. This usage however requires some care and attention on the part of both the pipeman and the engineer. Where either the pipeman or the engineer is careless or incompetent either the relief valve or an open nozzle should be utilized.

In the last three months the writer has noticed several different engine companies making use of 3-inch hose. The average water pressures maintained by these engines was considerably over 150 pounds, the highest pressure observed being 245 pounds and the lowest 98 pounds.

Incompetent Handling of Engines.

At the Parker Building fire the writer noticed the engine attached to the second section of Engine Company No. 16 standing idle at 9.10 P. M. which was about twenty minutes before the floors in the building collapsed. The fires under the boiler were out and the engineer was making no attempt to relight them. He stated to the writer that spray from the water tower had extinguished his fire. If this was the case it showed a lack of resourcefulness in not protecting his engine from the spray and also in not calling the attention of some officer to the random aim of the water tower in time to have it corrected. As far as the writer could see the engineer made no prompt attempt to get his engine going again.

Another case of incompetence on the part of an engineer was that of engineer John Ludlow, who was reduced for incompetent handling of his engine at a fire. Other cases of ignorance on the part of engineers have come under the writer's observation at almost every fire of importance.

ARRANGEMENT AND SELECTION OF HOSE.

Use of Large Size Hose.

SECTION 333 of the Rules and Regulations prescribes that:

"Companies equipped with 3-inch hose will use the same when called to fires on the second or greater alarms. Should the fire become extensive the first alarm companies, if equipped with a 2½-inch hose, will, in addition, stretch a line of 3-inch hose and substitute it for the 2½-inch line, or, if necessary, both lines may be used."

Section 334. "Companies equipped with 1½-inch hose will use it at fires when, in the judgment of the commanding officer, the fire will warrant its use; it will also be used in finishing up at fires, washing down, etc., relieving the large hose, which may be taken up or placed on tender or wagon."

Section 337. "Companies equipped with 3-inch hose will use this size hose on the entire line, when practicable, and with open nozzle . . . This size hose must also be connected to the 3-inch coupling on water tower when directed to connect the same. When working on roofs and fire escapes, the 2½-inch hose will be connected to 3-inch lines."

As previously stated the object of using 3-inch hose is to lessen the waste of power and pressure which accompanies the use of 2½-inch hose. Where a long line of 2½-inch hose will, for example, absorb say 100 pounds of the pressure in friction the same length of 3-inch hose discharging the same amount of water will absorb approximately half that amount of pressure or say 50 pounds in the case above cited. As a rule, when an engine fills a line of 3-inch hose no other line is attached, so that the full power of the engine is available for a single stream. Under these conditions a large size nozzle is desirable to make use of a large amount of water. If the line is a long one, the loss of pressure by friction in the hose again becomes considerable, owing to the increased flow of water through the hose. To reduce the loss of pressure still further it is often advisable to add a second line and siamese the two lines into one near the scene of the fire. This procedure is in fact prescribed in the orders of some other fire departments.

Siamesed Lines of Hose.

The effect of siamesing two lines, particularly when the distance to be covered is considerable, is very marked in the reduced waste of power through friction and the lower pressure which the engine is obliged to maintain in order to discharge a satisfactory stream. Take the case, for example, of Engine 29 at the Joy Line pier fire on March 30, 1908. Assume that a powerful 1½-inch stream was required showing 50 pounds pressure at the nozzle. This calls for 470 gallons per minute which is a quantity easily within the power of engine 29 which is rated at 900 gallons per minute. (In fact an engine of the size of Engine 29 when adequately handled might properly be expected to play a 1¾-inch stream with a nozzle pressure considerably in excess of 50 pounds.) The engine was approximately 1050 feet from the fire and required twenty-one lengths of hose in its line. If the line consists exclusively of 2½-inch hose the pressure at the engine required to

furnish a satisfactory 1½-inch stream will be in the neighborhood of 600 pounds. With a line of 3-inch hose the engine pressure would be reduced to about 300 pounds, while if a 2½-inch is siamesed with the 3-inch line into a 1½-inch nozzle the necessary pressure at the engine will be reduced approximately to 150 pounds. Thus an effective stream of large size from an engine remote from the fire is rendered possible through the use of two siamesed lines when a single line of 3-inch hose would leave such a stream outside the range of possibilities.

Although as previously stated the use of siamesed lines forms part of the regular practice in other departments, their use has been so rare in the New York department that blunders and delay are still apt to accompany attempts to employ this valuable application of engineering principles. The writer observed a delay of nearly 15 minutes in an attempt to run a siamesed line at a fire on South Street and it has been reported that the attempt to utilize a siamesed stream at the Parker Building fire was for a long time unsuccessful.

Increased Supply of Hose at Fires.

The methods suggested above of siamesing two lines to obtain a powerful stream of water would of course necessitate having an ample supply of hose brought to every fire . The lack of hose will in all probability be urged against this practice. In answer the writer would advocate providing adequate equipment to make use of the best methods even though the equipment called for may exceed what has been considered adequate in the past. In more than one progressive fire department, a reserve supply of hose is stowed on extra wagons ready to respond on second or greater alarms much in the same way that the fuel wagons are handled in the New York Department. In fact one fire department which carries at least 1,000 feet of hose on every hose wagon has a second supply of 1,000 feet of hose in every engine house in the business districts. This is an example which the writer believes New York would do well to follow.

Superfluous Hose.

Inasmuch as every 50-foot length in a line of hose adds materially to the loss of pressure by friction and consequently

requires the engine to maintain a higher water pressure in order to discharge an equally efficient stream, the practice of placing superfluous lengths of hose between an engine and the fire is to be severely criticised. Of course one or two or possibly three lengths of hose have to be pulled off the wagon at the scene of the fire in order that the nozzle may be carried wherever the circumstances may dictate. This necessary allowance of hose for shifting the nozzle, however, does not justify the many extra lengths which are to be found in one or more lines at almost every serious fire. The writer recalls, for example, the case of Engine No. 6 at the Wooster Street fire. The engine was stationed less than 500 feet distant from the building on fire and 16 lengths of hose, 800 feet, were visible in its line while one or more lengths probably extended the line beyond where it was visible from the street. As a consequence the engine had to hold a very high water pressure in order to produce a satisfactory stream with the result that its hose burst in more than one place. The water pressures observed at the engine by the writer was between 270 and 300 pounds. Attempts were made to cover the breaks with hose jackets while the pressure was on, but they proved futile and the engine had to shut down while the line was being repaired.

The writer has not made a point of looking for superfluous lengths of hose at fires but has been struck by this feature more than once. At a recent fire on Second Avenue corner 20th. Street, Engine No. 1 was stationed within 250 feet of the burning building and yet its line was 600 feet long. More recently (April 26, 1908) Engine Co. 29 had a line 650 feet long while the nozzle was kept in a building about 300 feet distant from the engine. The writer recently counted 29 turns of hose opposite a certain building while the total number of separate lines of hose passing that building could hardly have exceeded five or six.

Superfluous lengths are particularly undesirable and inexcusable when connection is made to some stationary object such as a standpipe or a water tower. The accompanying photograph of a water tower in action shows beyond question the superfluous length or lengths near the tower. It does not show whether or

not there were any other superfluous lengths between the limits of the photograph and the engine.*

SELECTION OF NOZZLES.

THE Rules and Regulations include no definite instructions in regard to the proper size of nozzle to be used, though, as quoted above, Sections 335 and 337 specify that nozzles of the open type shall be used whenever high pressures are maintained at the engine or when 3-inch hose is used. Sections 352, 353 and 354 all call attention to the necessity of taking particular care of nozzles in order to avoid denting them.

Size of Nozzles.

The usual practice of the department appears to be to attach 1¼-inch nozzles to lines of 2½-inch hose and 1½-inch nozzles to lines of 3-inch hose. For general purposes this practice is to be approved. It is open, however, to two criticisms:

1st. If a second line is attached to an engine which is attempting to play a 1½-inch stream the chances are that both the first and the second streams will be so weakened as to become ineffective.

2nd. When a hot fire calls for the full power of an engine better execution can ordinarily be obtained by engines of the first size by means of 1¾-inch streams, than by 1½-inch streams.

To fill a 1¾-inch stream properly two lines should be run from the engine and siamesed near the nozzle.

Type of Nozzle.

In regard to the particular type of nozzle used, the writer believes that the Fire Department would do well to make comparative tests between streams from large nozzles attached to hose 3½-inches in diameter and streams from nozzles of the same size attached directly to 2½-inch or 3-inch hose. The knowledge gained by such tests would be of value under such conditions as existed during the Parker Building fire when the attempt was made to throw a stream across Fourth Avenue.

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* The photograph referred to above shows several lengths of hose leading to a water tower, the hose lying in loops in the street.

USE OF WATER TOWERS.

Number of Streams.

THE practice in the New York Department when a water tower is operated at a fire is to utilize both tower nozzle and the deck nozzle even though the fire may be at so great an elevation above the street that the stream from the deck nozzle is necessarily unable to do effective work. Two examples of this misuse of the deck pipe occurred at the Parker Building fire where the stream from the deck pipe of the water tower on 19th. Street was aimed so sharply upward that it was of little or no value in reaching the fire. The stream from the deck pipe of the water tower in Fourth Avenue during the time that the writer observed it in operation not only failed to reach the stories in which the fire was burning but by taking valuable water which might otherwise have been directed through the tower nozzle thereby derived the stream from the latter nozzle of considerable water. The result was that for some time the stream from the water tower nozzle was unable to reach the part of the building where the fire was burning.

Connecting Pipes.

None of the water towers in service is provided with piping by which the deck pipe inlets can be connected with the tower inlets. Such connecting pipes are sometimes attached to water towers for the purpose of temporarily stiffening either the deck-pipe stream or the tower stream when necessary. By diverting part or all of the water from one nozzle to the other, two weak streams can be combined into a single powerful stream. By doubling the amount of water discharged through either nozzle, the nozzle pressure can be increased fourfold, with a corresponding increase in stiffness. Under certain conditions, such as existed at times during the Parker Building fire, the ability to stiffen one stream at the expense of the other may be of considerable value, and it is recommended that the water towers now in service be equipped with gates and pipes to enable them to secure the advantage of this arrangement.

Number of Towers Employed.

It is unusual in New York to see more than one tower working at any fire at any given time. In fact the book of assignments to stations provides for the presence of only one water tower even on fourth or fifth alarms. In other cities the assignment books make provision for having additional water towers early on the scene in case their services may be needed. At a building as extensive as the Parker Building, running some 150 feet on 19th. Street and 120 feet on Fourth Avenue, there appeared to be excellent opportunity for the use of certainly three water towers. Had the same amount of water been discharged through three water nozzles which was actually discharged through the two water towers and the two deck pipes, it is reasonable to believe that the effect on the fire during the early stages would have been much more marked.

Use of Water Tower with High Pressure Service.

When water towers are employed in conjunction with the new high pressure service it is probable that they will be called on to discharge greater quantities of water than hitherto. The reaction of the jet upon the nozzle will be more likely to cause the water towers to capsize,—an accident which has occurred in various cities where greater quantities of water are played through water towers than is the case in New York. In anticipation of the new device it is advisable to make careful tests of the water towers in order to ascertain what pressure can safely be applied without danger of overturning them and also to ascertain whether the struts intended to prevent the tower from capsizing are entirely reliable on smooth and hard pavements. The practice in other departments is to attach guy lines to the upper part of each tower to increase the security against capsizing. The writer is of the opinion that this double provision for safety is advisable in New York also.

USE OF STANDPIPES.

Advantages and Disadvantages.

THE practice of the department is to connect one or more lines of hose from an engine to a standpipe whenever such action appears to be advisable. Time is often saved by the use

of standpipes as they obviate the necessity of raising lines of hose to the upper stories of high buildings. On the other hand, the use of standpipes has decided drawbacks, the most serious being that more streams may be fed from the standpipe than the engine is able adequately to supply. Such a condition of affairs came under the notice of the writer at a fire in East 27th Street on May 25, 1907. An engine was connected to a standpipe in the Cornell Medical College from which three separate streams were supplied, and as a result none of the streams reached the fire effectively and the power of the engine and the efforts of the men were practically wasted. Similar conditions have been noted by the writer at other fires where unauthorized persons have attempted to handle additional lines supplied by a standpipe. To prevent the recurrence of this trouble the writer suggests that in all cases where a standpipe is utilized by the Fire Department, a company officer be made responsible for seeing that it is not taxed beyond the capacity of the engine by which it may be supplied.

Suggestion for a Portable Standpipe Company.

When lines of hose are needed in upper stories or over the roofs of buildings the usual practice is for each engine company to raise its own line to the required elevation by hand. If several lines are carried over the same roof this operation means the expenditure of considerable energy and a duplication of work. The writer presents for consideration the organization of a standpipe company whose duty it would be to place adequate lines of hose vertically in position whenever conditions call for them. The suggestion is to utilize some form of motor power in elevating several lines of large sized hose simultaneously into position. The writer is not aware that such a method is in use elsewhere, but he has been impressed by the frequency with which lines of hose have to be raised to considerable heights in handling fires in New York City, and with the desirability of raising these lines more expeditiously and effectively than at present.

USE OF AUTOMATIC SPRINKLERS, Etc.

Regulations and Practice.

SECTION 249 of the Rules and Regulations prescribes that: "Commanding officers upon arriving at fires in premises having automatic sprinkler equipments will at once report the fact to the officer in command thereof, and whenever practicable will order officers to make proper connections to said sprinklers for the purpose of more rapidly extinguishing fires, and a report of same will be made on the report of operations."

So far as the writer has been able to learn this rule has not been carried into effect in recent years. The reason given by the responsible officers for failing to attach lines from fire engines to sprinkler connections is that fires can usually be more effectively handled by means of engine streams than through sprinkler connections. Also as a rule the sprinklers are operating properly when the department arrives and additional water in the sprinklers is unnecessary.

It sometimes happens, however, that sprinklers do not operate properly owing to the supply tanks being empty, or accidentally gated off, or through some other disarrangement of the system. In such cases the prompt utilization of the sprinklers by the Fire Department might be of very great assistance in extinguishing the fire. Two cases of this description have recently occurred and on neither occasion did the Fire Department connect to the sprinkler system.

The first of these fires was in the building No. 191-193 Chrystie Street on December 3, 1907. Sprinklers of an inferior type were installed in this building and it is reported that owing to the poor pressure of the water supply available the sprinklers did not operate properly when the fire broke out. It is claimed that a higher pressure such as might have been obtained by connecting a fire engine to the sprinkler system would have caused the sprinklers to operate properly and have assisted materially in reducing the loss by fire. The damage occasioned by this fire to the building is reported to be $12,000 with considerably larger damage to the stock and merchandise contained in the building.

Another fire in a building equipped with sprinklers occurred on December 6, 1907, at the factory of the Carroll Box and Lumber Company, 627 East 18th Street. At this fire the sprinklers failed to operate, presumably because a gate in the supply pipe leading from the tank was closed at the time of the fire. The sprinkler system was provided with a suitable connection for Fire Department use, but this connection was not utilized by the department. Inasmuch as by means of the sprinkler system all of the water which an engine might pump through the sprinkler connection would be discharged directly upon the burning material, it is highly probable that the use of the system by the Fire Department would have been of material assistance in extinguishing the fire.

The claim is made by the Fire Department officers that the water was more effectively utilized in the streams which were played from the street and other neighboring locations. Such a claim is at least open to question. Fourteen engine companies responded to this fire and more engines could have been easily obtained by sounding an extra alarm. It would, therefore, have been entirely practicable to attach one or more of the engines to the sprinkler connection and still have enough engines left to furnish as many outside streams as the occasion called for.

It is to be regretted that no attempt was made by the Fire Department to utilize the sprinkler service in either of the two cases cited above; both because it is quite likely that by so doing the losses would have been reduced, and also because the use of sprinklers in these two cases would probably have furnished reliable information as to the benefit to be obtained by utilizing sprinkler connections at future fires.

Perforated Pipes.

The department makes use of perforated pipes with fair frequency and good success. Perforated pipes of course call for different treatment by the Fire Department from automatic sprinklers. Perforated pipes being always open can be brought into operation as a rule only when water is supplied to them by the Fire Department, whereas automatic sprinklers being at all times under water pressure operate instantly and automatically on the

outbreak of a fire. There is therefore more need for the Fire Department to connect promptly to perforated pipes than to automatic sprinklers if the fire is in a position where it can be reached by either of these appliances.

Sprinkler Installations.

The ordinances prescribe that buildings over a certain height shall be equipped with standpipes, auxiliary fire apparatus *and such other appliances as may be required by the Fire Department.* Also that buildings used for business or manufacturing purposes shall be provided with perforated pipes along the ceiling of each floor below the first floor, or in lieu of such perforated pipes, automatic sprinklers may be put in. (Part 19, Section 102 of the Revised Ordinances.) Section 762 of the Charter, which remains effective until changed by the Board of Aldermen, gives the Fire Commissioner power to direct owners of factories, hotels, tenements, mercantile buildings, etc., to provide certain specified fire appliances as well as "other means of preventing and extinguishing fires as said Fire Commissioner may direct."

It is strongly recommended that the above authorization be interpreted by the Fire Department to include requirements for automatic sprinklers in all buildings which by their construction, occupation or location might threaten to spread a growing conflagration to their neighbors. A requirement calling for the installation of automatic sprinklers, if adequately enforced, would add more to the security of the city against disastrous fires than any improvements which might be made in the equipment or personnel of the Fire Department.

While automatic sprinklers are not infallible, yet they have been proved by years of experience to be reliable in the vast majority of cases, and if they were provided with such a source of water supply as the new high pressure water system under a contant pressure of at least 100 pounds, their reliability would be considerably increased.

Comparing automatic sprinklers with perforated pipes, the former have so great advantages over the latter that it seems unreasonable to require the latter to be installed and not the former. Perforated pipes do not operate on fires until after the fire has

been discovered, an alarm sent out and the Fire Department has reached the scene. Then an engine must be connected to a hydrant and a line of hose stretched to the proper pipe connection. Meanwhile the fire has continued to burn and spread, and quite likely has burned away the supports of the perforated pipe just in those places where its services are most needed. Automatic sprinklers, on the other hand, operate as soon as the heat from the incipient fire reaches them, and thereby as a rule prevent the fire from extending beyond the incipient stage. For this reason it is sometimes claimed that they are only valuable against incipient fires, without realizing that practically all fires pass through an incipient stage and that the sprinklers by acting promptly prevent the fires from reaching more serious conditions.

Another great advantage possessed by sprinklers over perforated pipes lies in the fact that the sprinklers operate only in the immediate vicinity of the fire while perforated pipes necessarily flood the entire area which they protect. Thus in a building 100 or 150 feet deep a single sprinkler might easily control a fire without doing any water damage to stock more than ten or fifteen feet away. On the other hand, a perforated pipe would flood the entire area from front to rear, and it is quite possible that the immense amount of water thereby wasted would leave insufficient water to extinguish the fire if the latter happened to occur near the end of the pipe furthest from the source of supply.

It is therefore urged that automatic sprinklers be included among the appliances required by the Fire Department, and that the authority of the Fire Department to require such installation be extended to cover all buildings which may add to the fire hazard of their locality.

CHEMICAL ENGINES.

Lack of Chemical Apparatus in Manhattan.

THE New York Fire Department occupies an almost unique position among progressive Fire Departments in that it makes no use of chemical apparatus within the city proper: that is, Manhattan.

Advantages of Chemical Apparatus.

The advantages of chemical apparatus may be briefly summarized as follows:

1. Promptness in getting into action.

2. Ease with which chemical lines may be handled.

3. Sufficiency for all incipient and many well started fires.

4. Independence from hydrant troubles, such as inadequate supply, frozen hydrants, or defective hydrants.

5. Availability as skirmishers on the outskirts of a threatening fire.

6. Reduction in water damage.

7. Well adapted to handle fires in confined spaces.

8. The use of chemical apparatus permits the heavy apparatus to be dismissed more promptly from fires.

9. Less likely to obstruct traffic on a busy street.

10. Chemical engines can be quickly moved from place to place to check simultaneous incipient fires.

In advocating the use of chemical apparatus in the New York Fire Departments the following opinions of able Chiefs who have had long experience with such apparatus are presented.

The present Chief of the Baltimore Fire Department writes as follows, under date of March 16, 1908:

"MR. GREELY S. CURTIS,
No. 17 Battery Place,
"New York.

"*Sir:*—I beg to acknowledge the receipt of your favor of the 12th instant, and to reply as follows:

"1. I consider chemical apparatus essential equipment to all fire departments.

"2. Chemical apparatus is necessary wherever there is a fire risk.

"3. Yes. (In answer to question, 'Do you consider chemical apparatus of value in business, manufacturing, residential, tenement and suburban districts?')

"4. I have had forty years' experience with chemical apparatus.

"5. About seventy per cent. of the fires in Baltimore are extinguished with chemical apparatus.

"6. All hose wagons, of which we have thirty-three in actual service, are equipped with two thirty-gallon tanks each.

"Very truly yours,

(Signed) "GEO. W. HORTON,
"*Chief Engineer.*"

The Chief of the Boston Fire Department writes under date of March 24, 1908, as follows:

"CAPT. GREELY S. CURTIS,
"New York, N. Y.

"*Dear Friend:*—In reply to your questions, I would say that:

"I consider chemical apparatus to be a very essential part of the equipment of a fire department, especially in a city like Boston.

"I consider chemical apparatus necessary in all districts of this city.

"My experience extends over a period of thirty-five years with chemical apparatus.

"About fifty-five per cent. of the fires in Boston are extinguished by chemical apparatus.

"We have twelve straight chemical engines in service, and three in reserve. The following ladder companies are equipped with two thirty-five gallon tanks, each-L. 2, 6, 7, 10, 11, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27, fifteen in service and two in reserve. Two of our chemicals, C. 3, and 11, are old combination wagons, but for convenience we call them chemical companies.

"Every company in service is equipped with two or more extinguishers of the three-gallon type, beside one or more located on the main floor of each company house. The twelve straight chemical engines are not so equipped.

"Respectfully yours,

(Signed) "JOHN A. MULLEN,
"*Chief of Department.*"

The Chief of the Washington, D. C., Fire Department writes under date of March 24, 1908, as follows:

"MR. GREELY S. CURTIS,
"1512 Whitehall Building,
"New York City, N. Y.

"*Dear Sir:*—Your letter of the 19th instant, relative to chemical apparatus in the fire department, has just been received.

"In reply to the same I have to state that I was in this department for a very long time prior to the introduction of chemical fire extinguishers or chemical apparatus.

"I do not consider that any fire department is fully efficient without being equipped with combination chemical and hose wagons. On these wagons I carry two thirty-five gallon chemical tanks, four three-gallon or six-gallon fire extinguishers, and 1,200 feet of 2½-inch cotton, rubber-lined hose, or 1,100 feet of 2½-inch all rubber hose.

"I have discarded all of my straight chemical engines in the city proper. I have four of these chemical engines, however, each carrying two eighty-gallon tanks, and use them in the suburbs where there is neither water nor fire hydrants. I run two of these engines on the first alarm in order to make up for the deficit of water.

"I consider the combination chemical and hose wagons, as described above, necessary in all districts where hydrants are located and where a water pressure of from fifteen pounds upwards can be obtained.

"I consider chemical apparatus necessary in business centers, manufacturing centers, tenement districts, and residential and suburban districts. There were two hundred and fifty fires extinguished by chemicals in this district during the year ended June 30, 1907.

"In this department I have twelve combination chemical and hose wagons, each having two thirty-five gallon chemical tanks. I also have seven hose carriages equipped in some cases with two three-gallon fire extinguishers and one five-gallon extinguisher, in others with two three-gallon fire extinguishers, and in others with two six-gallon fire extinguishers.

"I have one piece of apparatus which I use in the suburbs and which was built on specifications made by this Department. It is built to carry one hundred and seventy-five feet of ladders, and the main extension ladder is forty feet long. It also carries two fifty-gallon chemical tanks and twelve hundred feet of 2½-inch cotton rubber-lined hose. This apparatus performs fine service and has given great satisfaction.

"Yours truly,

(Signed) "WM. T. BELT,
"*Chief Engineer.*"

Some years ago, when the chemical engine was still considered in a developmental stage a committee consisting of the Chief Engineers of the Chicago and Boston Fire Departments reported to the National Association of Fire Engineers on the subject of chemical engines as follows:

"The chemical engines are found to be most efficient in our large cities, as well as in the town or country, because of the rapidity with which they can be brought into service and because of the facility with which they can be changed from place to place, thereby often saving great loss by fire and water, which would be entailed by the use of larger and more cumbersome engine or hydrant streams. At every fire of any magnitude there are points to be covered quickly, and a chemical engine can be used to such good advantage in cases of this kind that one should always be on hand for use in any emergency. Two or three men are all that is necessary to successfully equip one of these engines, and on the score of economy too much cannot be said in their favor.

"Nearly every department in the country is now running one or more of these engines, and in no case are they looked upon with anything but favor. In fact, in the great majority of our fires nothing but a chemical is required to extinguish the flames, and where the fire assumes proportions beyond their control, they are found to be of great value in holding it in check until larger and more powerful streams can be located.

"The chemical engine can, therefore, be reckoned as one of the cheapest and best of modern appliances for the extinguishment of fires, and your committee feel no hesitancy in saying that chemical engines are necessary to the properly equipped fire department, and in their judgment would materially add to its efficiency. While in our large cities and manufacturing districts our main dependence must be placed in steam fire engines, yet your committee would recommend that at least one chemical engine respond to every alarm of fire, and they are unanimous in the opinion that they will prove their efficiency when placed in service, feeling sure that they cannot fail to recommend themselves to every practical and thinking mind.

"Respectfully submitted,

"WM. A. GREEN, *Chief of Boston Fire Dept.*

"D. J. SWENIE, *Chief of Chicago Fire Dept.*"

The arguments which were valid in the 80's while chemical engines were coming into favor, are equally valid at the present day. The writer has been present at numerous fires in New York where the services of chemical engines would have saved valuable time, damage and loss by water. On October 5, 1906, for example, the traffic on lower Broadway was held up for the better part of a half hour while a slight fire in a kitchen flue was being clumsily and inadequately handled by means of pails of water and other makeshifts methods. A chemical engine would have extinguished the fire with neatness and dispatch in a couple of minutes.

The Fire Department carries lines of 1½-inch hose for attachment to larger lines and also has small size tips to screw on to the full size nozzles. Both these devices are intended for use at fires similar to those against which other cities would employ chemical engines. The writer has further observed several petty fires at which these minor appliances were not in use, as the department apparently preferred to work with the full size streams, even though unnecessary water damage was caused thereby.

LADDER SERVICE.

IN the use of ladders as vantage points from which to fight fires, the methods of the New York Fire Department differ noticeably from those employed in other large cities which have come under the writer's observation. Comparative statistics on such a subject are obviously impossible to present, but as a matter of simple observation the fact is obvious that where other cities make a practice of surrounding burning buildings closely with ladders on all sides the New York practice is more frequently to trust solely to water tower streams on the street front and possibly streams from fire escapes in the rear. The Parker Building, for example, offered an opportunity to play streams at close range into the fifth and sixth floors from ladders just outside the windows. Ladders might also have been used at the Worth Street fire of February 4, 1908, instead of leaving the entire attack against the eighteen street windows to the water tower and its deckpipe. In the rear of the Worth Street fire there were opportunities for ladder work which would almost certainly have been utilized to advantage by other departments. The value of medium size streams played at close range is illustrated by some of the photographs of the Worth Street fire taken by the writer.

To provide adequate ladder service, however, particularly at elevations from fifty to seventy feet above the street and in locations difficult of access to the aerial trucks, additional equipment of portable extension ladders would be necessary. The writer has been told that instead of increasing the equipment of such ladders, the recent policy of the department has been to retire such few as were in the service. Yet the portable extension ladders have some advantage over the pompier ladders which practically have

displaced them. As regards their availability at catastrophes such as the Windsor Hotel fire, there can be no comparison between the secure footing for rescue work afforded by a substantial 60-foot or 65-foot extension ladder and the risky support of the frail pompier ladders.

For taking a line of hose into an upper window a pompier ladder is obviously unsuited, while an extension ladder is well fitted for this use. The aerial ladder is of course also well adapted to this work, but the number of these aerials which can be conveniently stationed in front of any building is limited. To supplement the aerial ladders and to provide adequate ladder service in places inaccessible to aerials, the writer advocates an increased equipment of portable extension ladders from 50 feet to 65 feet in length.

MISCELLANEOUS APPLIANCES.

Smoke Helmets.

THE department is at present fairly well equipped with what is known as Vajen-Bader smoke helmets. These appliances have rarely if ever been used at actual fires, and it is doubtful if they would afford satisfactory protection for more than a very brief time. The helmets are designed to fit closely enough over a fireman's shoulders to keep out the outside air or smoke. Each helmet is provided with a small tank containing compressed air which is discharged into the head piece normally in the course of half an hour's use. A very brief computation will suffice to show the inadequacy of the apparatus. The tank is about 3½ inches in diameter and 8 inches long, and contains therefore somewhat less than eighty cubic inches of air. The maximum pressure in the tank is limited to 100 pounds, approximately seven times atmospheric pressure. Thus the maximum amount of air which the tank could discharge into the headpiece in the course of thirty minutes is less than 600 cubic inches. It is said that for normal respiration about three hundred cubic inches of air are required per minute and that when a man is vigorously employed the amount of air necessary is very much greater. If these figures are even approximately correct the supply of air carried in the tanks would suffice for only two or three minutes' work even

if the discharge valve from the tanks were so designed as to liberate all the air contained therein ten times more rapidly than it is designed to operate. Under the circumstances the apprehension and distrust with which these appliances are regarded in this and other Fire Departments appear to be well founded. To make a helmet of this type practical the tank would have to be greatly enlarged and some modification of the valve be made so that a fireman could obtain fresh air as rapidly as he might need it. Some kind of an alarm would also be essential to notify the wearer a minute or two before the supply of fresh air was exhausted.

Another type of smoke helmet in which fresh air is supplied from outside sources is in service in the London and Paris Fire Brigades. In this type of helmet air is supplied through tubing in the same way as to a submarine diver, from bellows or some other form of pump. In its best shape the supply pipe acts as a speaking tube so that the fireman using the helmet remains always in communication with his associates outside. Whether such an equipment would be of practical use in the New York Department can be determined only by practical trials. The writer believes that the introduction of such an appliance is highly desirable, and that the device should be given frequent tests under service conditions.

Ladder Pipes.

Ladder pipes or nozzles mounted on the upper parts of extension ladders are employed by various departments as auxiliaries for water towers. Some of these ladder pipes are arranged to swing horizontally and vertically, and can be controlled from the ground as well as by a man mounted on the ladder. One of the advantages possessed by these ladder pipes over water towers is that they can be brought closer to a window or other opening than a water tower and from this closer distance can rake some parts of a burning building inaccessible to a water tower. There is no reason why such pipes should not be applied to the tips of 85-foot ladders and thereby become available against fires two or more stories above the limit reached by the present water towers.

Deluge Sets and Turret Nozzles.

The deluge set is an appliance by which two or more lines of hose can be siamesed and the resulting stream discharged effectively from a single large nozzle. The writer has had many opportunities to study the effects secured through the use of these appliances. The results demonstrate beyond question that these or similar appliances are of great value in handling fires which have obtained considerable headway.

Turret nozzles mounted on wagons are also of value in furnishing powerful streams. In the New York Department the wagons of the Engine Companies Nos. 58 and 60, stationed in Harlem and the Bronx, respectively, are equipped with nozzles of this type. Opinions differ somewhat as to the relative merits of deluge sets and turret nozzles, but engineers are well agreed that an ample supply of one or both of these appliances is essential to the proper equipment of a city department. The following opinions have been received from the Chiefs of the Baltimore, Washington and Boston Departments.

BALTIMORE FIRE DEPARTMENT.

"All hose wagons are equipped with deluge sets which are very effective at threatening fires.

(Signed) "GEO. W. HORTON,
"Chief Engineer."

WASHINGTON FIRE DEPARTMENT.

"For delivering large and powerful streams I have on eight of my combination chemical and hose wagons, the wagon monitor or turret pipes, with three-way siamese connections to each. I use two-inch nozzles and these take the place in the center of the city, of ground deluge sets. This is done because the wagon pipes require only one man to operate them while it takes six or seven men to hold a deluge set to the ground, and then they are unable to move about with it.

"In addition to these wagons, I have five deluge sets, with two-way siamese, which are used on the out-skirts of the city. I also have two which I use in the downtown district, one with a three-way siamese and 2½-inch nozzle, and the other with a four-way siamese and 3-inch nozzle.

"I prefer the wagon pipes to the deluge sets for the reasons stated above. If you put from four to eight of these wagons in front

or on the side of a building you will see the black mark very quickly.

"Eight of my aerial trucks are equipped with ladder pipes and I have had considerable experience with them. No difficulty has been encountered in getting a two-inch stream from them by using a second size engine and the stream can be thrown from one hundred and eighty to two hundred feet. I find these ladder pipes are very good for the front and rear of a fire. I have had two of them working on a large fire in addition to my seventy-five foot Champion water-tower, one in the rear and the other on the side of the building, while the tower was playing on the front.

"Yours truly,

(Signed) "WM. T. BELL,

"Chief Engineer."

BOSTON FIRE DEPARTMENT.

"This Department has equipped each of its forty-five engine companies with a deluge set. In addition, an extra large jumbo set is carried on a wagon which responds to third alarms, and several other sets are carried on the fire-boat. Among the Special Orders issued by the Boston Department is one under date of July 10, 1899, reading as follows:

"'You will instruct district chiefs that all engines responding to second and subsequent alarms are to use siamesed connection when possible; written reports are to be made when such are not in use.'

(Signed) "H. S. RUSSELL,

"Commissioner."

The written reports mentioned in the above order were regularly referred to the hydraulic engineer of the department, who was held responsible for the proper application of the best engineering methods in handling fires.

Hose Couplings.

The use of 2½-inch couplings on 3-inch hose is recommended as being in keeping with sound engineering principles. In a large proportion of cases where 3-inch hose is used, a part of the line consists of 2½-inch hose which in the New York Department has to be connected to 3-inch hose by means of a special reducer. Special reducers are carried by every company equipped with 3-inch hose, but the use of reducers is always a possible source of confusion and delay. It is frequently necessary to replace a length of burst hose either 3-inch or 2½-inch and if the proper size of

hose is not ready at hand, a reducer and an enlarger must be obtained in order to utilize a length of the other size.

There is a liability that the wrong size hose will be selected to piece out a line which needs to be extended and if the reducers do not happen to be readily at hand delay will result. A striking example of this difficulty came under the writer's observation at the Parker Building fire where he noticed several lengths of 3-inch hose cast aside on the upper floor of the Florence House evidently because the couplings would not connect with the 2½-inch stand-pipe outlet on the upper floor of that building.

The objection that reducing the size of the couplings materially increases resistance to the flow of water is not borne out by investigation. The matter has been studied by different authorities and all agree that the obstruction caused by a 2½-inch coupling in a line of 3-inch hose is so small as to be negligible for fire service. Couplings of the character suggested, namely, of proper size to attach to 3-inch hose and yet equipped with standard 2½-inch thread are practical appliances as shown by the fact that more than one progressive department is making use of them with good results. A sample coupling of this character is shown herewith.*

SUGGESTIONS ON HIGH PRESSURE SERVICE.

Pressures on Hose.

SOME apprehension has been expressed that ordinary hose will be unsuited for use with the high pressure service when the latter becomes available for fire duty. With siamesed lines of hose and nozzles properly adapted to the work in hand, there seems to be no reason why the hydrant pressure should often exceed 200 pounds, a figure now sometimes exceeded by fire engines. As even this pressure will involve difficulty in handling the lines it seems likely that lower pressure will become the rule for regular fire service. Excessive pressures appear to the writer

*(A sample coupling for 3-inch hose was kindly loaned by the Boston Fire Department, and was exhibited to the Honorable Commissioner of Accounts.)

to involve difficulties in handling, danger to the men at the pipe, and needless strain on the apparatus. The advantages to be gained by very high pressures are not obvious. The writer is of the opinion that with moderate pressures and with lines of hose kept reasonably short, standard Fire Department hose should prove entirely satisfactory. Of course this does not refer to the inferior grades of hose purchased in recent years for the department but to hose of standard brands having established reputations throughout the country.

Reducing Valves and Gauges.

In order to render the high pressure service properly available for every day fire duty some provision will have to be made to permit the use of controlling nozzles on lines attached to the system. Some form of pressure reducing valve is the obvious solution for this difficulty. Such a valve to be effective should possess the following features:

Portability; to permit quick attachment to any hydrant outlet.

Ample water way; to secure an unobstructed flow of water whenever desired.

Adjustability; to maintain any desired pressure on the water in the hose.

Immediate relief on shutting off the line. It will be desirable to have the valve so designed as to limit the pressure on the line to say forty or fifty pounds the moment the flow is stopped at the nozzle.

Pressure Gauge. Each valve should be equipped with a double gauge showing the pressure both on the hydrant and on the line side of the valve.

Durability.

The features mentioned in this list will be necessary to give the proposed service the flexibility and adaptability now obtained through the aid of fire engines. Without some such device as that proposed above the system is in danger of becoming so unwieldy and difficult to handle that the firemen will be inclined to oppose its general adoption and thereby prevent the full development and utilization of an extremely valuable means of safeguarding the city.

To get the best results out of the new system its use by the firemen must be made as easy and as satisfactory as possible, for this reason high pressures are to be deprecated unless absolutely necessary and the employment of reducing valves such as those described above is to be urgently advocated. The question of success or failure of this very expensive and up-to-date system of fire fighting must depend very largely upon the details of equipment and methods adopted for its use.

GENERAL TECHNICAL EFFICIENCY.

AS EFFICIENT fire fighting is so essentially a branch of practical engineering calling for trained engineering skill almost as much as artillery and railway construction service, it is advisable that one or more technically trained engineers be employed permanently by the Fire Department to point out ways and means of improving the efficiency of the department's work. An engineer after gaining a year or two experience in the Fire Department should be able to offer valuable suggestions to the commanding officers in regard to the proper handling of threatening fires and as to generalship in meeting difficult situations. In both of the two latter respects the work of the New York Department has seemed to the writer to be below a desirable standard. This is not intended to imply that the responsible officers of the New York Fire Department are either incompetent or below the usual standard of ability to be found in Fire Chiefs. It merely indicates the writer's belief that sound technical training and education added to experience makes a more successful combination than experience alone. As a rule Fire Chiefs have few opportunities to obtain either a technical training or an engineering education and yet it is obvious that both of these valuable acquirements can be used to good advantage in the execution of their professional work. It is to make good the deficiency along these technical lines that the writer urges the permanent employment of trained engineers by the Fire Department.

Among the many subjects on which a competent engineer could offer valuable counsel would be the following:

Classifying and marking hydrants according to the adequacy of their water supply.

Intelligent coöperation with water works engineers to secure improvements in the water supply.

Use of auxiliary appliances including separate high pressure fire main systems, building standpipes, connections to sprinklers, so-called water curtains, local appliances, etc.

Care, maintenance and operation of fire engines.

Use of large hose and siamesed lines.

The selection of nozzles properly adapted to circumstances.

The most effective use of water towers, turret nozzles and other appliances to deliver powerful streams.

The use of chemical engines and combination wagons, small streams, searchlights, etc.

Strategy against threatening fires.

Selection of equipment.

Acceptance tests for new apparatus.

More efficient maintenance and operation of the fire alarm system.

Requirements for future development of the Fire Department.

IMPROVEMENTS RECOMMENDED.

Water Supply.

1. That an exhaustive study be made of the hydrants and distribution system throughout the city, for the purpose of grading and marking the hydrants so as to indicate the probable capacity of each hydrant under conditions of great dratt. The hydrants with inadequate and with ample water supplies should be indicated on maps supplied to all Fire Department officers, and the actual hydrants should be conspicuously marked with their respective gradings.

2. That one or more trained engineers be attached to the Fire Department, and that these engineers report all cases of inadequate water supply actually encountered at serious fires. The engineer's reports should be so drawn up as to present the defective conditions accurately to the Department

of Water Supply with suggestions indicating the proper remedy to meet the defects.

Selection of Hydrants.

3. That the trained engineers referred to in the last preceding recommendation draw up general instructions concerning the proper selection of hydrants by engine companies at serious fires. It is suggested that after ten engines have responded to a fire in a location where the adequacy of the water supply is doubtful, all succeeding engines shall be stationed on large mains which preferably do not pass directly by the scene of the fire.

4. That one or more of the engineers previously referred to, respond to every second alarm, and assist the commanding officer in locating late arriving engines at suitable hydrants.

5. That definite instructions be sent to all officers in charge of large size engines specifying which individual hydrants are to be avoided by them .

Attaching to Hydrants.

6. That the use of small size hydrant connections and small hydrant outlets be limited as far as possible to the engine company which is " first due " at any fire.

7. That the practice of connecting two engines in tandem to a single hydrant be restricted exclusively to those hydrants where the adequacy of the water supply is beyond question.

Operation of Engines.

8. That each engineer of steamer receive frequent practice in operating his engine under competent supervision.

9. That the engineers of steamers be given adequate instructions in the technical features of their work, and that this instruction be continued after they have become permanent engineers. They should be instructed in all the symptons indicating trouble in the engines and how to cure all minor defects. They should also become familiar with the methods for ascertaining the slip of the pumps and should make tests periodically to determine the condition of their engines.

These tests should be made under competent supervision. Any engineer showing lack of ability or incompetence should be either returned to the ranks or be required to pass again through the training school for engineers.

10. That the rule limiting steam pressures to 80 pounds be rescinded.

11. That no engine while playing a stream larger than 1¼ inches shall attempt to play a second stream.

Arrangement and Selection of Hose.

12. That engine companies shall run two lines of hose to a siamese connection whenever the full power of the engine is required and the engines are not stationed in close proximity to the fire.

13. That engine companies be given sufficient practice in handling siamesed lines to make them proficient in their use.

14. That at least 1200 feet of 3-inch hose be kept loaded on a reserve hose wagon in every battalion, ready to respond to all second alarms in that battalion district.

15. That the trained engineers (see the second recommendation under "Water Supply") exercise supervision over the arrangement and length of lines of hose used at serious fires, criticising in their reports all superfluous hose and other objectionable features observed.

Selection of Nozzles.

16. That nozzles of larger size than 1½-inch be used by first size engines in good condition when the full power of the engines is called for and the supply of water is adequate.

Use of Water Towers.

17. That careful discretion be exercised in the use of the deck pipes in conjunction with water tower streams. It is recommended that a connection with a controlling gate be made between the deck pipe inlets and the tower inlets on each water tower. By the use of this connection the stream from either nozzle could be augmented at will at the expense of the other stream.

18. That regular provision be made in the assignment book for the response of two water towers to third alarms from localities where their services may be needed.

19. That the water towers be equipped with guy ropes in anticipation of their use with the new high pressure system.

Use of Standpipes.

20. That whenever a building standpipe is used, a company officer or Chief be made responsible for seeing that it is not taxed beyond the capacity of the engines by which it may be supplied. He should be made repsonsible for securing additional supply from other engines when necessary.

21. That an investigation be made into the practicability of establishing one or more standpipe companies. The purpose of such companies would be to raise adequate lines of hose to the roofs or upper stories of high buildings more expeditiously and effectively than is done at present.

Automatic Sprinklers.

22. That the rule calling for the attachment of fire engines to sprinkler connections be made obligatory and be strictly observed by the Fire Department.

23. That the authority now vested in the Fire Department to require the installation of standpipes and other appliances in building of certain specified heights or occupancies, be extended to cover all buildings which may add materially to the general fire hazard of their localities.

24. That automatic sprinklers be specifically included among the auxiliary fire appliances which the Fire Department is authorized to require installed.

25. That connection with the new high pressure system be required as a duplicate source of supply for all automatic sprinkler installations situated within the territory protected by this service. This recommendation is based on the proposition that a reliable sprinkler equipment in any building adds to the security of its neighbors against a sweeping fire. Consequently, as a matter of general protection for the city every sprinkler installation should be made as reliable and efficient

as possible. Connection with the high pressure system—even through a service pipe of size small enough to prevent serious accidental bleeding of the system—will undoubtedly add to the reliability of any sprinkler installation.

Chemical Engines.

26. That an adequate equipment of chemical apparatus be provided, so that at least two of the companies responding to every alarm shall be equipped with chemical tanks of large size. It is recommended that at least one chemical engine company be established in each battalion district, and that in addition, one or more companies in each district be equipped with chemical tanks.

Ladder Service.

27. That the equipment of each of the principal ladder companies include at least one portable extension ladder over 50 feet in length.

28. That more frequent use be made of ladders in attacking fires which have to be handled by outside streams.

Miscellaneous Appliances.

29. That an adequate equipment of smoke helmets of a more efficient type than the one now in service be provided.

30. That individual firemen be given suitable training and practice in the use of smoke helmets so as to be fully prepared for any emergency likely to arise.

31. That at least one aerial ladder truck in each battalion be equipped with a suitable ladder pipe.

32. That a deluge set, turret nozzle or similar appliance to facilitate the use of powerful streams be carried by every engine company. Careful tests should be made of the relative merits of such devices in order to secure the most efficient type.

33. That all 3-inch hose be equipped with 2½-inch couplings having threads to fit the couplings on the 2½-inch hose.

Use of High Pressure Service.

34. That only moderate pressures be maintained at the hydrants for ordinary service.

35. That a full equipment of specially designed reducing valves and gauges be carried by every engine or hose company which is likely to be called to a fire in the protected district. Spare equipments for emergency use should be kept in every battalion within the district.

Technical Efficiency.

36. That high class instruction in engineering principles and their application be provided for all assistant foremen and higher officers. This instruction should be recognized in the examinations for promotions to higher positions. (See also in this connection Recommendation No. 2 under Fire Methods—Water Supply, which calls for the employment of one or more trained engineers by the Fire Department.)

PART III

APPENDICES

A: PARKER BUILDING FIRE
B: REPORT ON HOSE SPECIFICATIONS

(Appendix A.)

OBSERVATIONS

Taken at the Parker Building Fire, Between 8 and 11 P. M., January 10, 1908, by Greely S. Curtis, Consulting Fire Department Engineer.

OPERATION OF FIRE ENGINES.

Engine 1.

Engine No. 1 was attached to the new large hydrant on the north side of 19th Street, just west of Fourth Avenue. At 8.37 P. M. although the engine showed a steam pressure of 120 pounds, the water pressure maintained by the pumps was very low, the pressure gauge on the discharge showing only 57 pounds. There was no gauge on the suction by which the hydrant pressure might be ascertained, but the water spurting from the joints of the suction connections indicated that the supply was adequate. The engine ran at relatively high speed, 275 revolutions per minute, which taken in conjunction with the low water pressure maintained indicated the existence of some defect of more or less serious character. The trouble may have been due to any one of the following causes:

Pump valve defective or missing.

Relief valve objectionably wide open.

Nozzles in use too large for engine to fill.

Burst hose.

Engine 14.

At 8.33 Engine No. 14 which was connected to the small hydrant on the east side of Fourth Avenue, just north of 19th Street, was filling two lines. Steam pressure 120 pounds, satisfactory. Water pressure, 98 pounds, moderate. Hydrant pressure shown on the engine's compound gauge, 8 pounds, barely sufficient. Speed of engine, 135 revolutions per minute or somewhat less than half its full speed. The total amount of water being

pumped could not have exceeded 440 gallons per minute, while the engine is rated at 900 gallons.

Engine 16, First Section.

This engine was stationed on the west side of Fourth Avenue just north of 19th Street. The engine was connected to the small outlet of the hydrant instead of the large one. This injudicious selection of outlets in conjunction with the small diameter of the suction use by so many of the engines, combined to cut down the already inadequate water pressure to a serious extent. According to the writer's recollection, a majority of all of the engines observed by him in the first hour were attached to small sized outlets and used suctions of small diameter. This practice indicates that the department does not employ ordinary engineering methods to make the best use of the notoriously inadequate water supply. When observed at 8.35, Engine No. 16 had two lines attached, held 96 pounds steam pressure and 180 pounds water pressure, while the suction pressure was reduced to 2 pounds. Speed 230 revolutions per minute, fair. Quantity of water pumped probably less than 500 gallons per minute.

Engine No. 16, Second Section.

This engine was stationed at the nearest hydrant to the fire, on the southeast corner of Fourth Avenue and 19th Street. At 9.10 P. M. it was standing idle and dead, the engineer stating that spray from the water tower had extinguished his fires. This showed lack of resourcefulness in not protecting his stack by some article near at hand and also in not calling the attention of some officer to the random aim of the water tower in time to have it corrected. A disheartening feature of this occurrence was the fact that the engineer so far as the writer could see, made no prompt attempt to get his engine going again.

Engine 21.

This engine was stationed on Irving Place just north of 18th Street, where a fair supply of water might well be counted on. At 10.50 P. M. when the fire had been in progress for more than 2½ hours and the need of water was critical, the engineer told the writer that his engine had not yet been put to work, but had

been standing idle at a presumably plentiful hydrant. This hydrant moreover was much nearer the vantage point in the Florence House than were several hydrants which were actually in use.

Engines 25 and 72.

These two engines were at first connected in tandem to the small hydrant on the north side of 18th Street, just east of Fourth Avenue. This hydrant was poorly selected for the purpose. At about 8.40 P. M. Engine 72 was standing idle, while No. 25 was slowly turning over, with both of its attached lines of hose shut off. The engineers stated that their lines were connected to the water tower which was not then ready for water. On being asked the hydrant pressure, one engineer read off 30 pounds on the suction gauge attached to Engine 25, totally ignoring the fact that the cock which admitted the pressure was closed. The cock was so firmly stuck that it seemed likely it had not been open for a considerable time. The companion engineer then read the pressure off his discharge gauge, alleging that as his lines were shut off, the discharge pressure must be the same as the hydrant pressure. In this assumption he entirely neglected the fact that the operation of the pump was at the time producing 20 or 30 pounds pressure in excess of the hydrant pressure. Such flagrant ignorance in trained engineers is almost incredible. The actual pressure with no water flowing was about 8 pounds, as was shown by a gauge attached to Engine 72, which stood between Engine 25 and the hydrant. Later on Engine No. 25 was moved elsewhere on account of insufficient water. At 10.42 P. M. Engine No. 72 being at that time alone at its hydrant, its suction gauge showed a vacuum of 2 inches while the engine was running at the low speed of 120 revolutions per minute. This speed would limit the discharge of Engine No. 72 to less than 400 gallons, even assuming perfect condition. But the pounding of the engine while running indicated that its condition was not perfect and that some part of the pump machinery needed adjustment.

Engine 28.

Engine No. 28 was connected to the hydrant on 19th Street and Irving Place with one line of hose attached. A second line was being stretched at 8.28. The engine was turning over slowly

with its relief valve open and was playing no water, the line being shut off for some reason unknown to the engineer. Hydrant pressure not recorded. This was the only engine at that time on 19th Street near the water main in Irving Place, and as stated was doing no work when observed.

Engine 55.

At 10.45 P. M. this engine stationed at the small hydrant on 18th Street about midway between Fourth Ave. and Irving Place, was attempting to fill two lines. Steam pressure, ample, as shown by blowing off at safety valve. Water pressure, 130 pounds. Suction pressure, 2 inches vacuum. Speed 175 revolutions per minute. It is doubtful whether the pump chambers were filling properly even at this moderate speed, as an attempt to increase the speed immediately resulted in running away from the water. The maximum possible discharge under this inadequate hydrant supply was 560 gallons and the actual discharge was probably considerably less.

As it is unusual for engines in good condition to run away from their water under so slight a vacuum as 2 inches, this occurrence certainly points to defects in the condition of the pumps of No. 55 Engine.

OPERATION OF WATER TOWERS.

Water Tower 2.

At 8.29 P. M. fire could be seen from 19th Street enveloping the eastern end of the fifth, sixth and the two highest floors of the Parker Building. The fire appeared to be already well started on all intervening floors judging from the dense masses of smoke and the intermittent flickers of light to be seen reflected on their ceilings. Water Tower 2 had a good stream in the fifth and sixth floor windows, and at 8.29 was being properly handled. The turret nozzle (or deckpipe) stream from the rear of the water tower was of satisfactory stiffness, but in the writer's opinion was even at that early stage being improperly directed. Futile attempts were made to put the stream into fifth story windows lying obliquely westward, and insufficient care was taken in aiming at the openings. This led to a large amount of water being

wasted on the outside of the walls. At 9.06 P. M. the stream from this turret nozzle was observed playing into the street instead of into the building, with the result not only of wasting an immense amount of precious water and allowing the flames in front of it to increase unchecked, but also as the writer was told, of extinguishing the fire under the boiler of an adjacent engine and putting the latter out of commission. How long this stream had been so grossly misdirected the writer does not know. It caught the eye of the Acting Chief of the department at 9.07 and was immedately corrected. Prior to that time the Acting Chief had been stationed on the Fourth Avenue side of the fire and could not see what Water Tower No. 2 was doing.

Water Towers on Fourth Avenue.

At 8.31 a water tower was observed taking position on the Fourth Avenue side of the building. By 8.36 this tower was elevated and the tip raised ready for work. Four or five minutes later the tip had been lowered and a man was aloft trying to remedy some trouble which thus delayed the prompt utilization of a very important tool. Returning to Fourth Avenue twenty-five minutes later, the writer observed streams being played by both the tower nozzle and the turret nozzle of Water Tower No. 3. The stream from the upper nozzle struck the wall of the building between the windows on the fifth or sixth floor, while the turret stream failed to reach the windows on those floors by many feet owing to the lack of pressure. At 9.11 the situation was a little worse, as the tower nozzle stream also had slacked down until it hardly reached the fourth floor. Nevertheless these two streams were allowed to continue wasting the all-essential water, when by combining the same total amount of water in either one of them, an effective stream of nearly fourfold stiffness would have been produced.

HANDLING OF FIRE STREAMS.

Siamesed Streams.

Powerful streams formed by combining two or more separate lines of hose into a single nozzle are recognized as the most effective means for controlling a serious fire when it has gained considerable headway. With the exception of the inadequate water

tower streams previously described, no siamesed streams were seen in operation by the writer during the critical early hours of the fire.

Location of Streams.

The location from which the smaller streams were played were as a rule satisfactorily selected, but there were two exceptions to this rule.

One was a stream from a window on the eighth floor of the Florence House. At about 9.20 P. M. the writer noticed this stream playing down into a half shuttered window of the Parker Building on the floor below. From its position, the stream could strike only about five square feet of bare wall surface down near the floor and a very limited area on the floor itself where it could have no extinguishing effect upon the fire. If the nozzle had been shifted to a near-by window on the floor below, the stream could have swept both ceiling and floor through the same opening and could have penetrated to the heart of the fire, a change which would have increased the effectiveness a hundredfold. This change was suggested to a staff officer, but as he was not on fire duty he declined to forward the suggestion to the officer in charge, even though he saw its value. He said he considered it injudicious to " butt in." This useless stream consequently continued to waste water, and at 10.30 after the men had been ordered from that part of the Florence House, the writer found the nozzle lashed to a bar across the same inferior window and so clumsily held in place that its stream struck squarely against the outside of the shutter on the Parker Building window only fifteen feet away. Thus every drop in that stream was worse than wasted, as the same water if not discharged through that particular nozzle might have gone to strengthen some other needy and useful stream.

Another poorly placed stream was the one handled by Engine Company No. 17. At 9.02 P. M. this company was in charge of a stiff 1¼-inch stream which was directed at a sixth story window on the Fourth Avenue side of the Parker Building. The men holding the pipe stood on the sidewalk almost directly under the window which they were trying to penetrate some 65 feet above them, with the result that their stream could not possibly enter

the building more than a very few inches before striking the ceiling full and square. How long they remained in this injudicious position, the writer does not know. They were still there at 9.12 P. M.

GENERALSHIP.

THE fact that the fire during the critical period was attacked by means of large sized, but necessarily ineffective, streams from the street level while the obvious vantage points in the rear of the Florence House were occupied exclusively by a few streams all of small size indicates very poor generalship. The attack would have been more effective if the street streams had been restricted to the two water-tower nozzles and the main power of the engines had been concentrated in siamesed streams directed from the rear against the fifth and sixth floors of the Parker Building. Small streams, if used at all, should have been played at close range from ladders outside the street windows.

SELECTION OF HYDRANTS.

IN THE immediate vicinity of the fire were five or six, old style, inferior hydrants and one large new hydrant which it was reasonable to suppose was fed by a new main of ample size. When it was desired to set two engines at a hydrant, in tandem, one of the inferior hydrants was selected instead of the new one which had the better supply of water. Naturally the old and inferior hydrant proved inadequate to supply the two engines and one engine had to be moved to another location, thereby depriving the department of its usefulness at a critical time.

LADDER SERVICE.

WHILE the writer did not pay particular attention to this feature at the time, he was later struck by the contrast presented by this fire with fires in other cities where portable 60-foot and 65-foot ladders are regularly used to give additional close range vantage points. His recollection is that one aerial and two shorter ladders were raised on the Fourth Avenue side of the Parker Building, none of them being located at windows through

which the fire could be directly fought at the time they were raised. No ladders were raised on the 19th Street side. The details of this item may be inaccurate, but the salient fact remains, that ladders were not used to their full advantage for close range fighting. Any experienced fireman will admit that a moderate sized stream played into a room from the window sill is much more effective than any turret nozzle stream coming obliquely from a point 50 or 60 feet below.

LIFE SAVING WORK.

IN REFRESHING contrast to the mistakes observable on all sides was the well executed and successful attempt by a truck company to rescue a group of men from the roof of the Parker Building. The efficient use of the life gun and line, and the safe descent of the refugees to the roof of the Florence House over 60 feet below was a stirring spectacle to those who were lucky enough to be present.

THREE-INCH HOSE COUPLINGS.

SHORTLY before 9.30 the writer's attention was called to three discarded lengths of heavy 3-inch hose lying cumbering the passage way on the eighth floor of the Florence House. The hose had been carried to that point at a considerable expense of time and effort and then had evidently been thrown aside because the 3-inch couplings would not connect with the 2½-inch couplings to which it was desired to attach them. This blunder obviously necessitated a second trip to the street to get the proper size hose from the hose wagon at a time when every second of delay counted. More progressive departments have couplings of uniform dimension on their 2½-inch and 3-inch sizes of hose so that mistakes like the foregoing are impossible.

SAFEGUARDING THE FLORENCE HOUSE.

ALMOST instantly after the partial collapse of the Parker Building floors at about 9.30 P. M. the rear portion of every floor burst into a vigorous flame. The accidental hole from the

roof to the cellar produced by the collapse formed an excellent flue, and in few minutes every one of the 130 unshuttered windows opening on to the light shaft between the two buildings became an ardent source of radiation. Slightly more than 40 feet away, forming the other two sides of the light shaft, stood the eight story Florence House with its ell extending north almost to the eastern corner of the Parker Building. Seventy windows were directly exposed to the intense heat in the light shaft and several of these had their panes cracked by the heat. Seeing this, ordinary caution would have dictated an immediate inspection of all exposed window frames in the Florence House and the prompt establishment of a systematic patrol through the exposed rooms on every floor. In addition to the radiant heat actually beating against the windows of the Florence, that building was exposed to a much more serious danger from the possibility that the walls of the Parker Building which towered some 60 feet above the roof of the Florence and which appeared to be seriously damaged at the level of the third floor might collapse, and in falling break some 100 or more windows in the rear of the Florence House through which openings the fire would then flash from ground floor to attic in an indescribably short time. At about 10 o'clock the writer found that one of the three battalion chiefs on duty in the ell of the Florence House had previously begun an inspection and had interrupted it to assist in clearing out the occupants of the house. There were, however, sufficient unoccupied officers and men in the ell to have inspected the entire building many times over, and yet between 10.30 and 10.40 P. M. the writer found many scorched window casings in apartments which evidently had not been entered since their owners had left them some hour or more previous. Most of these apartments were in the main body of the hotel which had early been deserted by the occupants.

Owing to the great danger threatening the entire surrounding neighborhood if the fire once gained a foot hold in the Florence House, this neglect to maintain a constant watch over the danger points inside that building appears to deserve severe censure.

CHEMICAL ENGINES.

THE situation in the Florence House for hours during the progress of the fire formed a striking commentary on the exclusion policy of the department in regard to chemical engines which had been held during the last few decades of progress. Here was a building which alone could prevent a mere hot fire from turning to a sweeping conflagration. It was exposed at some seventy points to heat which was severe enough to crack more than sixty panes of glass. A little more heat, a slight widening of a breach in the Parker Building walls or an unfortunate shift in the wind would have been sufficient to set fire to the Florence in many places. And to handle these incipient fires the moment they were discovered without withdrawing the streams already needed against the main fire, what could equal the effective streams from a battery of chemical engines? Their easily handled lines should have been stationed at strategic points ready to respond instantly wherever fire might be discovered.

The value of these engines for other service beside that of light skirmishers is so well established throughout the country that it would be superfluous to record here the arguments for their general adoption.

EXECUTION OF ORDERS.

SOON after 10 o'clock orders were given for the companies in the ell of the Florence House to retire to positions of safety, each company to leave one man in charge of its stream which was to continue playing. In some cases the larger part of a company remained at the pipe, while in others two men stayed with the nozzle, the balance of the companies waiting near at hand.

At about 10.15 P. M. a battalion chief attempted to get men to patrol the danger points. After some delay a squad of truckmen was sent up from the ground floor with orders to station two men on each unguarded floor, which included all the floors above the third. On reaching the fourth floor instead of two men, the larger part of the squad left the elevator, leaving three or perhaps four men to cover the floors above. A trifling detail but indicative of lax discipline.

ENGINES 55 and 72 were unable to obtain sufficient water from two hydrants on 18th Street when observed by the writer. The feeble streams discharged by Water Tower No. 3 showed that they were not receiving an adequate supply of water. Two engines ought to be able to furnish sufficient water for a powerful water tower stream if the water is obtainable from the hydrants to which they are attached; consequently the feeble streams observed, considered in conjunction with the inadequate hydrants on 18th Street indicated a decided paucity in the water supply obtainable from the hydrants nearest to the building on fire.

RECAPITULATION.

Engines.

A total of ten inspections were made of nine different engines. Five of these, or 50 per cent., disclosed engines standing idle at a time when a destructive fire was getting beyond the control of the department. The other five engines were running at an average speed of 187 revolutions per minute, or considerably less than two-thirds of the speed necessary to discharge their full capacity of water. Moreover three of the five working engines gave evidence of defective condition. In regard to their handling, the use of small suctions and of small hydrant outlets combined with minor exhibitions of ignorance and want of resourcefulness shown by their operators, indicate a condition of incompetence in the ranks of the engineers. (See N. B. F. U. Recommendations Nos. 33, 34, 35, 36, 48, 49, 61; below.)

Water Towers.

Of the four streams furnished by these valuable appliances, three were for a considerable time entirely thrown away and wasted through lack of judgment. One tower also was temporarily put out of order when an attempt was made to operate it.

(See N. B. F. U. Recommendations Nos. 46, 59, 60.)

Handling of Fire Streams.

The powerful siamesed streams at close range, which are relied on by progressive fire departments to control fires of threatening character, were conspicuous through their entire absence during the critical stages of the fire.

(See N. B. F. U. Recommendations Nos. 56, 60.)

One if not two of the ordinary streams were so injudiciously placed that the usefulness of these streams were practically wasted.

Generalship.

The fact that the fire during the critical period was attacked by means of large sized, but necessarily ineffective, streams from the street level while the obvious vantage points in the rear of the Florence House were occupied exclusively by a few streams all of small size indicates that the generalship was of an inferior order.

Selection of Hydrants.

One case at least showed poor judgment.

Ladder Service.

Ladders were used only to a very limited extent, less than the situation seemed to call for.

(See N. B. F. U. Recommendations No. 57.)

Life Saving Work.

The rescuing of a group of men from the roof of the Parker Building by means of life gun and line was a redeeming feature. An admirable piece of work successfully accomplished.

Three-inch Couplings.

The mistake and delay due to carrying the wrong size of hose to the top of the Florence House was a blunder naturally resulting from faulty equipment. The selection of couplings for 3-inch hose should be made in accordance with engineering principles.

(See N. B. F. U. Recommendation No. 55.)

Safeguarding the Florence House.

Measures of ordinary, though vital, precaution were taken slowly, partially and without proper system. The inefficient manner in which the work of inspecting the danger points in the Florence House were carried out endangered the entire neighborhood.

Chemical Engines.

The absence of chemical apparatus forms a serious deficiency in the city's equipment. This type of apparatus while primarily intended to combat incipient fires, may under certain conditions assist in the prevention of a conflagration. (See N. B. F. U. Recommendations Nos. 51 and 53.)

Execution of Orders.

The unsatisfactory manner in which two orders were carried out, while it may be a mere detail, is nevertheless a detail which reflects unfavorably on the strictness of the discipline enforced.

Water Supply.

Indications observed during the early period of the fire while the total number of engines actually drawing water from the system was not great, showed that several of the engines were not obtaining sufficient water from their hydrants, and that the distribution system in the immediate vicinity of the fire was not properly designed to furnish an adequate supply of water from all hydrants in that locality in case a large amount of water were needed.

The recommendations referred to above are the following, made by the National Board of Fire Underwriters in the Report of the Committee of Twenty, on the City of New York, Boroughs of Manhattan and the Bronx, dated November, 1905.

33. That an able and expert mechanical engineer, with one or more assistants, be appointed supervisor of machinery, and be given full control of the operation, repair and testing of all apparatus and of the fitness of the engineers of steamers and their assistants. He should be held personally responsible for the condition of every engine and other piece of apparatus in the department, and should test all new and repaired engines before they are placed in service. His duties should include the supervision of all engines in operation at second and subsequent alarm fires.

34. That all engineers of steamers now in the department be subjected to a thorough, practical examination as to their ability in running and caring for engines, and only those who are fully competent be permanently retained.

35. That the abler engineers of steamers be attached to companies in the more hazardous localities.

36. That the grade of assistant engineer be created, to be filled only after suitable instruction under well qualified instructors. Candidates should be required to obtain the full working capacity from engines in good working condition before being appointed assistant engineers, and no fireman should be eligible to the grade of engineer of steamer until he shall have served one year as assistant engineer.

46. That two additional water towers and the reserve tower be put in service; one near Fulton and Church Streets; one with engine 56, at West Eighty-second Street near Columbus Avenue; and one near East One Hundred and Forty-third Street and Third Avenue.

48. That every engine be given an exhaustive test, pumping against a water pressure 100 pounds in excess of hydrant pressure, and only those which are able to maintain a discharge of at least 650 gallons per minute be retained for service in Manhattan. Those engines which fail to discharge 90 per cent. of their rated capacity should be overhauled, and those which fall below a discharge of 500 gallons per minute after overhauling should be discarded.

49. That the pumps and boilers of the following engines be put in good condition: Engines 2, 11, 13, 16a, 18a, 26a, 30b, 33a, 33b, 34, 37, 45, 71,, 80a; reserve engines: first battalion, seventh battalion.

51. That the apparatus throughout the city be so provided with chemical tanks that at least two companies so equipped shall respond to each first alarm.

53. That two 3-gallon portable extinguishers be included in the equipment of every hose wagon.

55. That all 3-inch hose be fitted with 2 ½-inch couplings; 4-inch hose with 3 ½-inch couplings; and the variety of coupling dimensions in use be reduced to a minimum.

56. That a deluge set, turret nozzle or other device for conveniently handling powerful siamesed streams be carried on every hose wagon.

57. That one extension ladder 60 or 65 feet long be added to the equipment of the principal ladder trucks, and that aerial trucks purchased in the future be of a quick-raising type.

59. That two water towers be regularly assigned to third alarms from localities where their services may be required.

60. That use be made of siamesed streams whenever single streams are ineffective or when unusually powerful streams are required. Their employment should be part of the regular routine of engine companies at second and third alarm fires.

61. That instead of dismissing engines from fires when the supply of water proves inadequate, such engines be sent to more remote hydrants on large mains, and their services be utilized through siamesed lines of hose.

(*Appendix B.*)

REPORT ON HOSE SPECIFICATIONS.

NEW YORK, June 2, 1908.

Frank R. Chambers, Esq.
Chairman Committee on Insurance
The Merchants' Association of New York

SIR:

CARRYING out your instructions to investigate (a) the general subject of specifications for Fire Department hose, and (b) in particular the recommendations concerning hose for the New York Fire Department made by the National Board of Fire Underwriters in their report dated December 20, 1907, I have to report as follows:

(a) The formulation of proper hose specifications is at present the subject of active discussion between the manufacturers of fire hose and a special committee of the National Fire Protection Association which practically represents the National Board of Fire Underwriters. Although the latest draft of the N. F. P. A. specifications contains certain provisions which I believe undesirable, it is likely that some modification will be made, so that the N. F. P. A. specifications in their final form will probably be suitable for adoption by all large city Fire Departments including the Fire Department of New York City.

The N. F. P. A. specifications, however, in their present form lack a vital provision, namely: a guarantee clause to ensure durability in the hose. As the shortness of its life forms the most serious objection to all rubber or rubber-lined fire hose, it seems essential to call for a guarantee covering a period of at least three years. Some of the tests prescribed by the N. F. P. A. are intended to secure durability in certain parts of the hose, but it is at least questionable whether the tests will ensure durable hose in the absence of any service guarantee. Service guarantees are required by other cities than New York, as for example by Baltimore which calls for three years' service under specifications which state in detail the classes of failures during the service of the hose for which the makers will be held responsible under heavy bond.

The Washington D. C. requirements call for a general four-year guarantee, also under bond.

(b) Taking up the December, 1907, recommendations of the National Board of Fire Underwriters and the action taken thereon by the New York Fire Department, the situation is about as follows:

Recommendation No. 1.

"That the department purchase (in addition to amount recently ordered) 20,000 feet of 2½-inch, 20,000 feet of 3-inch and 5,000 feet of 3½-inch hose, to be distributed in Manhattan, especially below Fifty-ninth Street, this hose to be delivered at the earliest possible date." The Fire Department reports that more than 200,000 feet of hose have been ordered, of which 70,000 feet is 3-inch and 15,000 feet 3½-inch. About 50,000 feet have already been received by the department.

Recommendation No. 2.

"That this hose be purchased under a 300-pound, four-year guarantee, with specifications worded in a general way so as to permit makers of either rubber hose or cotton, rubber-lined hose to bid." The latest specifications of the Fire Department call for a 400-pound, four-year guarantee, but separate specifications are made out for rubber and for cotton rubber-lined hose. Prominent hose manufacturers protest against the severity of the guarantee, their objections being raised against both the four-year term and the high pressures called for. I am credibly informed that no reliable hose maker has put in a bid to supply cotton rubber-lined hose under the latest form of specification, their objection resting principally on the severity of this guarantee clause. For hose which is subject to such severe treatment as is the case in New York, I believe that a 200-pound, four-year guarantee is as much as could be reasonably expected from any conservative and reliable hose maker. I see no advantage in wording the specifications so as to permit makers of either rubber hose or cotton rubber-lined hose to bid under a single set of specifications.

Recommendation No. 3.

"That rubber lining be of not less than three calendars and not less than 1-16-inch thick, no maximum limits being set."

The Fire Department early in the winter specified that linings should be 1-12-inch thick. Later specifications issued in April call for linings not less than 1-16-inch or more than 1-12-inch in thickness. The latter Fire Department specifications are satisfactory.

Recommendation No. 4.

"That every section purchased be subjected to a pressure of 200 pounds per square inch at the factory, in the presence of a representative of the New York Fire Department." The Fire Department has adopted this recommendation with the modification that the factory test pressure shall be 250 pounds. No mention is made of the presence of a representative of the Fire Department at such test. Recommendation No. 4 seems to me to be unnecessary if the hose is to be properly tested by the department before acceptance, particularly as many if not most manufacturers test all hose under pressure before allowing it to leave the factory.

Recommendation No. 5.

"That on delivery one length in each lot of 5, taken at random, be subjected to the guaranteed pressure of 300 pounds, any failure to be cause of rejecting entire lot of 5 lengths." This recommendation has been practically adopted by the Fire Department with increased severity as follows: " . . . Each and every length of the hose or 20 per cent. of the total amount of hose, shall, in the discretion of the Fire Commissioner, be subjected by the department officials to a pressure test of 400 pounds per square inch." The Fire Department is thus at liberty in case any length of hose should burst at 400 pounds to subject the entire shipment to the same pressure and to reject at will either the entire shipment or merely those pieces which fail under the test. The provision of the Underwriters by which a random lot of 5 lengths shall be rejected because of the failure of any sample selected from the five does not seem to be rational. If the department has reason to believe that more than one or two lengths in any shipment are too weak the proper procedure is to test every length in the entire shipment. This is done in some other large departments.

Recommendation No. 6.

"That the stretching test for rubber lining be from 2 inches to 10 inches (instead of 12 inches), with a permanent set of ⅛-inch." The latest New York Fire Department specifications retain a 12-inch stretching test for the rubber lining instead of the 10-inch test recommended by the Underwriters. In conferring with manufacturers I am inclined to believe that the 12-inch test adds materially to the cost of the hose without securing any compensating advantage in return. In fact it is a question whether the lining showing the greater elasticity can be made as durable as a less elastic lining. Under the circumstances the recommendation of the National Board of Fire Underwriters should be urged upon the Fire Department for adoption. Opinion is divided as to the ⅛-inch limit specified for permanent set. Some makers believe that the limit is too small and that a ½-inch limit would result in securing equally durable linings at less cost.

Recommendation No. 7.

"That specifications for weight and strength of cotton duck and for yarn used in cotton covers be abolished, as this is covered by the four-year guarantee." I do not concur in this recommendation as it was the absence of such a specification which permitted the acceptance of the Windsor hose by the Fire Department. Other irresponsible companies or persons might follow the example of the Windsor Fire Appliance Company in foisting inferior hose at low prices on the department and then failing to live up to their guarantee, if no tests were made of the strength of fabric before acceptance.

Recommendation No. 8.

"That no bid be considered unless from a manufacturer of, or dealer in, fire hose." This recommendation is of doubtful value. The Windsor Fire Appliance Company might properly claim to be a dealer in fire hose and consequently eligible to provide the Fire Department hose.

Recommendation No. 9.

"That in cases where agents (not direct representatives of hose manufacturers) file a bid, they must specify the brand of hose

to be supplied and the bid must be accompanied by the manufacturer's guarantee." This recommendation might well be adopted. The value of the guarantee given by each manufacturer would to some extent depend upon his commercial standing. A suitable bond, covering more than the entire value of the contract is called for in some other cities.

Recommendation No. 10.

"That any bid may be rejected in whole or in part." The present usage of the Fire Department conforms to this recommendation.

Recommendation No. 11.

"That upon delivery of the above-mentioned hose, the department shall test all hose on hand, over one year old, to a pressure of 200 pounds per square inch, until all has been tested or until an amount equal to that delivered has been bursted; in which case the department shall purchase as speedily as possible a further lot of hose to replace that burst, and upon its delivery continue the testing until hose has been tested throughout the Boroughs of Manhattan and the Bronx." This recommendation deserves endorsement. The Fire Department has expressed its intention of acting in conformity with this recommendation as soon as circumstances permit.

Recommendation No. 12.

"That prompt measures be taken to enforce the fulfillment of the guarantee on hose purchased during the last three years; this applies especially to the Windsor, Eureka and White Shield brands." The Fire Department reports that the matter of enforcing the guarantee to replace defective hose has been placed in the hands of the Corporation Counsel.

Recommendation No. 13.

"That bids be immediately advertised for at least 8 hose wagons as designed by the Fire Department, to be used in connection with the High Pressure Fire Service." The department has already ordered three hose wagons spcially designed for

use with the high pressure system. It is probable that the regulation department hose wagon can be utilized in the same connection.

Recommendation No. 14.

"That a supply of 3-inch hose be purchased, about 30,000 feet, to equip the high pressure hose wagons. This hose should be purchased under similar liberal specifications as the other department hose, but should be guaranteed to stand 400 pounds pressure, every length should be tested to 300 pounds, and every fifth length to 400 pounds. This also should be delivered as early as possible." This has been ordered and in part already received by the Fire Department.

To sum up, the Fire Department has already taken favorable action in regard to the essential features of recommendations Nos. 1, 2, 3, 4, 5, 10, 11, 12, 13 and 14. Of the other four recommendations I believe that Nos. 6 and 9 are worthy of adoption while No. 8 is unimportant and No. 7 is decidedly objectionable.

Referring to the latest hose specifications of the New York Fire Department, the department calls for several radical changes by the manufacturers from their established practice. Many of these changes I believe to be ill-judged. In view of the excellence of certain brands of hose purchased in the past I believe that the specifications should be so drawn as to permit the acceptance of these brands without requiring changes in their construction. To accomplish this purpose the specifications of the Fire Department governing the chemical constituents of the hose lining would have to be modified, the stretching test should be changed to 10 inches instead of 12, and the composition of the brass specified for couplings should be altered so as to render it less brittle. At the same time, the guarantee should be made less onerous in order to make it acceptable to reasonably prudent business men. It is obvious that a long term guarantee on hose involves considerable risk to the manufacturer, as the exterior portions of the hose which carry the strain are subject to severe usage and the Fire Department claims the right of deciding whether the hose bursts through defective construction or through the effects of accident or wear.

I believe that the best way to secure serviceable hose for the department would be to permit the Fire Commissioner under proper safeguards to purchase the brands of hose which have given best service in the past without calling for open competition.

Respectfully submitted,

GREELY S. CURTIS.
Consulting Engineer.